THE

JOURNAL

OF

GAS LIGHTING,

WATER SUPPLY,

ETC.

VOL. CXVII.

JANUARY TO MARCH, 1912.

LONDON:

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

1912.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXVII., No. 2538.—TUESDAY, JANUARY 2, 1912.

EDITORIAL NOTES—GAS, &c.

Professor Lewes on Carbonization Development.

THERE are some candid critics that one can always tolerate, though probably not in complete harmony with their views; and one such critic is Professor Vivian B. Lewes. He was a severe critic of the gas industry's carbonizing methods in the final lecture of the Cantor series, as published *in extenso* in our columns last week; and therefore the lecture holds, for the gas maker, of the four the largest amount of interest. Professor Lewes takes his stand on the scientific chemical investigation, as traced in this valuable series of lectures, of the processes of carbonization as now practised in gas-works. Each process is more or less found wanting, though the new methods of carbonization are a very substantial improvement on the old ones. Of the new methods, the continuous vertical system (the lecturer firmly believes) is the superior of the others, and the one most capable of further development along the ways that carbonization for gas and coke production should go. Whether these ways as conceived by Professor Lewes are the best in all respects is open to considerable doubt, as, marshalling his conclusions in orderly array, and inspecting them not only from the theoretical standpoint, but from the commercial and the practicable, the result is that, however strong and true the theoretical part of his argument may be, the issues of the suggested methods of technical procedure appear too hypothetical commercially, and too opposed to public custom and preferences, to induce gas manufacturers to venture—except perhaps tentatively—from the lines of an assured profitable position into fresh and largely unbeaten tracks. If (we iterate "if") the gas industry could only compel the public to take as a fuel for domestic purposes a coke in which a higher percentage of the volatile matter had been retained at the sacrifice of perhaps a production of about 3000 cubic feet of gas, there might be a greater encouragement to the industry than there is at present to view the proposition in a brighter light.

We have not yet definitely stated here what the proposition is. It will have been gathered by those who have read the lecture as printed in our pages last week; and we will briefly sketch it a little later. It is not a revival of the coalite process. It is something less revolutionary. It is something that far exceeds the limits of that process, but falls short of the new practices of the gas maker. And the weakest part of the proposition is that Professor Lewes has not—at all events, he has not publicly shown us that he has—studied completely the financial side of his suggestion from the purchase of coal to the large market that his lively imagination pictures for an improved coke for domestic purposes. However, for the interesting proposition, we think there is indebtedness to two things; and they are, the study by Professor Lewes of the coalite system on the one hand, and the study of the newer processes of gas manufacture on the other. We freely admit—there is no denial with this lecture before us—that the coalite process has contributed not a little to the knowledge of the actions and reactions that proceed in carbonization, as well as of the differences, and how occasioned, between the primary and secondary gas yields. But the coalite system has proved something else to us. It has proved that the views of the mass of the public as to solid-fuel values are not to be stretched by any sentimental considerations, or by any particular regard for the sanitary conditions of the atmosphere. Persuasive considerations must touch them inside their houses more than outside, before they will be prepared to pay a higher price for their fuel; and there are ample signs that, for labour-saving and for convenience in the home—by, for instance, the installation of gaseous heating—they are prepared to pay somewhat more for fuel. However good a coke may be, it does not carry the saving of labour to the same degree as the gas-fire. The attitude of the public is one of the two rocks on which the proposition Professor Lewes has now offered is likely to be wrecked; the other being the actual works' cost involved by the change in manufacturing procedure. It is indisputable that the total realizable revenue to be obtained per ton of coal carbonized, less costs of production, must be the guide as to the best course of technical method; and this net realizable revenue does not depend, as Professor Lewes apparently thinks, upon the exertions of the gas maker alone. It has, *plus* these exertions, to rely on the influences that variously act and react upon his markets.

Warning and criticism are freely found in the lecture. We have the warning that, by the present systems of carbonization, we are approaching the ultimate stage at which further manufacturing economies can be secured, and at which the manufacturing economies *per se* can contribute to the reduction of price. Though economies have been effected by the newer processes that give us, among other gains, a higher make per ton from which the consumers have largely benefited, we are told that, instead of gas makers taking a pride in the production of (say) 13,000 cubic feet of gas, they ought to be heartily ashamed of the performance, when chemical consideration is given to how it is obtained, with the deterioration of the coke for domestic purposes. But anyway even Professor Lewes—when he looks at the figures he submitted, reducing the makes, under the new methods of carbonizing, to common bases of illuminating and calorific power—cannot deny that it is a respectable gas that the gas maker is now giving to his consumers, and that financially the industry never stood in a stronger position. And therefore things are not, practically regarded, at all in a bad way. In fact, he gives credit to the new systems for a large, but only a partial, improvement from the chemical point of view.

Ideals for gas making have been presented time and again; and every gas engineer who knows his business can trundle out the principles underlying the ideal in coal carbonization for gas manufacture as easily as he can say the alphabet. Uniform treatment of every particle of the coal and of the whole of the gas evolved is required; and the prevention of the degradation of the valuable hydrocarbons by hot surface contact is an essential. To attain these ideals, if scientific teaching is of any value, then (says Professor Lewes) continuous vertical retorts must be the type of carbonizing plant in the future. Product chemically considered, the present systems in his opinion are not, nor anywhere near, perfect. We have not the least doubt that the designers and inventors of the systems would be the last to suggest that they had reached a pitch of perfection that rendered these systems incapable of further improvement. What invention has there ever been that could confidently claim finality in its own line? But the continuous system is the one Professor Lewes would use in his new scheme. He would employ the Glover-West means of regulating temperatures, and utilize the spent coke at the bottom part of the retort for heating the secondary air. He would go back to the idea of the Settle-Padfield system, and mechanically drop intermittent small charges into the retort with a *pro rata* intermittent mechanical discharge at the bottom. He would revert to the vacant space above the charge, and have it highly heated, so that a large volume of gas would be evolved as the coal entered the retorts. The poorer gas, washing upwards, would mingle in the vacant space with the richer gas under the influence of the radiant heat. There would be with this system, he thinks, comparatively little surface contact. [Perhaps Mr. Samuel Glover and Mr. John West could tell of charging disadvantages they experienced with the vacant space at top of their retorts.] A good volume of uniform and rich gas, would, Professor Lewes points out, be obtained under his system. He would leave by heat regulation 6 to 8 per cent. of volatile matter in the coke, sacrificing the end make of 3000 cubic feet of gas, in order to secure the better coke

which, he calculates, would have a higher market value—if there was a demand at the higher prices on the part of the public. The public, however, would continue to patronize the solid fuel that met their requirements, and that would be the cheapest in price. To compensate for the loss of the 3000 cubic feet, the gas produced, being rich, would stand the addition of 4000 to 5000 cubic feet of blue water gas, and still keep within the statutory requirements as to quality. Result: More gas and a better coke for sale.

It is a picture that, in the whole, is pretty and attractive; but the details of it want very close examination. What Professor Lewes has not done (and this cannot be done by any chemical analytic or synthetic treatment) is to show whether the balance of losses and gains from the change in method would really represent additional profit. That is the main consideration; and it cannot be settled upon paper alone. If development should be in this direction, Professor Lewes will be entitled to a large share in the credit. Should development not be in this direction, then we can look upon it as a well-intended and serious attempt to make a practicable suggestion for coke improvement on the one hand, and an advance on the former proposals of Professor Lewes for the utilization of blue water gas in town-gas production—an advance made quite feasible in his scheme by the developments in carbonizing plant and practices.

Prompt Publicity.

THE machinery for the work of the British Commercial Gas Association is not yet completely organized; and the fault for this does not rest with headquarters, but with the slow compliance with the request of the Provisional Committee for a prompt appointment by subscribers of representatives for the Association, and the selection of members for the General Committee, from which the active Executive Committee will be drawn. When the machinery is perfected (we hope an announcement to this effect will shortly be made), it will, we take it, have as part of its constitution some one who will be in a position to comply with what is an essential in such work as is to be carried on—that is to say, the essential of being able to deal, without waste of time, with newspaper matters that, we know from past experience, are bound to crop up frequently, and it is quite possible in future with increasing frequency.

Let us illustrate what we mean. Supposing a daily or a weekly paper publishes matter that is intended to, or if not intended does, unjustly degrade gas in the eyes of the public, the British Commercial Gas Association must have some one in position who will be able, without waiting for the calling together of the Executive Committee, to send promptly to the editor a rebutting communication. A great deal depends upon expeditiously dealing with such a matter, seeing that every hour that the statements are allowed to go uncorrected, or unchallenged, the mischief grows, and delay may be given as a reason by an editor for declining to reopen the subject. It will be insufficient for a subscribing undertaking to communicate to headquarters information (with a copy of the paragraph or article) as to the publication in a newspaper of matter that is detrimental to gas interests, and then to receive a simple acknowledgment, with an intimation that the question shall be brought before the Committee for consideration. Procrastination of this kind will not do. The subscriber, if the matter is one that can really be dealt with in the form of an ordinary communication, will hope to receive not only an acknowledgment, but an announcement that, by the same post, or within a post or two, a communication has been, or will be, addressed to the editor of the paper concerned. But, of course, where the local conditions require explanation for the matter to be dealt with thoroughly, subscribers must not expect anyone detached from all knowledge of these conditions to deal with the matter without their aid; nor, if the matter is purely a simple local one that can be disposed of direct, would it be fair to add to the work of headquarters by asking that it be dealt with from there. In work of this kind there must be reciprocal help.

In the article elsewhere in this issue, describing the additional efforts that the Electricity Publicity Committee are putting forward and projecting, there is an extract from an article by Mr. H. B. Renwick, the Chairman of that Committee. Therefrom it will be observed that Mr. Renwick speaks of what he terms the "silent" newspaper work that is carried on from the headquarters of the Committee. He generally mentions the character of this work; and he gives to it high rank among the activities of the Committee. That prompt treatment of affairs that crop up in newspapers unexpectedly and frequently—the readiness to serve when there is the call—we agree with Mr. Renwick (though we may not always be in harmony with him as to method) is one of the most valuable features in the performance of the functions of a publicity organization, no matter the name by which it is known.

It will be seen by the article to which reference is made in the preceding paragraph, that the Electricity Publicity Committee are putting forth fresh energy to cultivate within the electricity supply industry a greater trust in them, and a still larger financing to enable them to expand their work in, we opine, among other directions (if precedent is followed), the vilifying of gas in the eyes of the public. The Committee make boast of what they have already effected in their endeavours to educate the public in electrical matters, and in advertising the uses of electricity, which advertising includes as an important phase the abuse of the rival. In this connection we have, in the article in other columns, asked Mr. Renwick a pointed question; and we shall be glad if he will give in our columns a frank answer. However, the signs of an increased energy mean one of two things—either that the Committee have been losing their hold upon their supporters, or that they genuinely believe that the electricity industry will now, having seen the nature of the work they have done (some electrical people are not by any means enamoured of it), be prepared on appeal to augment the financial resources of the Committee. Whichever reason is the true one, the gas industry will see that the British Commercial Gas Association must have whole-hearted support to properly and effectively grapple with the work that an increased vigour on the part of the opponents will force upon them—more particularly if calumny is to continue one of the principal planks of the electrical platform. Now that Christmas is over, we ought surely to hear something as to the progress of the work of organizing the Commercial Gas Association's machinery.

Practical Proofs of Surface Combustion Efficiency.

BETWEEN Dr. W. A. Bone's lecture in Glasgow and those he recently delivered in America, the proof of the practical application and economic utility of surface combustion has made what must be considered an important stride forward. High-placed are the hopes centred in the developments of gaseous heating; and therefore the gas industry is intimately concerned in the nascent practical applications that Dr. Bone and his collaborators—Mr. C. D. M'Court and Mr. James W. Wilson are working hard to mature. All such effort—effort and painstaking investigation extending, on the Doctor's part, over several years—is entitled to the utmost encouragement and protection that the gas industry all the world over can offer; and the more development can be hastened to prove, step by step, the practicability or otherwise (we are not accepting as certain practicability in any direction until the proof of cost and efficiency are forthcoming) of surface combustion, the better and the quicker will the limits of general knowledge on the subject of value expand. We cannot say precisely where we are in this matter; nor can Dr. Bone and his associates. A new development of this kind means much unsparing work individually on the part of the originators, and it means much work that must necessarily be of a tentative nature. It is in all respects the opening up of new ways in an unexplored land; but it is a land that Dr. Bone and his colleagues believe, and believe firmly, to be full of bright promise.

In such a novel departure as this—a departure that means a large parting of the ways in custom and practice—pioneers have always in their path the formidable difficulty of raising interest in those quarters where it is most desired, and, even when real merit is offered, to obtain the encouragement of participation in risk and trial under working conditions that is so essential and valuable at the beginning. It is almost as difficult as trying to drive a wedge in a rocky formation. Comparisons are not always odious; they not infrequently are useful as lesson carriers and stimulants. Here is the principle of surface combustion, holding out the prospect in the first place to industry of a means of heating that, from what has been seen and what has been done, suggests economy through high heat efficiency, through acceleration of work, and through a lessening (in some directions) of capital expenditure; and yet there is hardly visible at present the indications of interest on the part of our British manufacturers. The scene shifts to America. The intelli-

gence regarding surface combustion reaches there, the hopes of a practical utility built upon a base the soundness of which is (so to speak) guaranteed by the highest scientific authority are heard of, and all—scientists and manufacturers—were eager to hear direct from Dr. Bone (and, when he left America to resume his duties at the Leeds University, from Mr. M'Court) of the work done, and how far advanced were the practical proofs of the new methods. The indications are that in America the manufacturers are more prepared than they are here to take upon themselves some amount of risk if there is a creditable degree of assurance as to future advantage in the suggested change in practice. This is the true encouragement that workers such as Dr. Bone and his colleagues deserve at home, but which we have not the slightest doubt they find it extremely hard to obtain. Yet it is here at home that their very presence offers the best facilities in the work of development.

But to come to the new testimony as to practicability, economy, and efficiency. We well remember the large uncouth-looking boiler, with its comparatively crude equipment, upon which the trials of surface combustion in steam-raising were made at Armley, and photographs of which were shown at the Royal Institution lectures, and at the meeting of the Institution of Gas Engineers at Glasgow, and were reproduced in our columns. The efficiency even under such conditions was high; but Dr. Bone and his collaborators realize as well as anyone that the results of such tests carried out with parental care, and with all the advantage of the supervision of those who have been working at development stage by stage, are not so acceptable as actual results under everyday working conditions. We have these now in the matter of steam raising. The boiler fixed at the Skinningrove Iron-Works that it had been announced was in course of construction has been finished; and when Dr. Bone was before his American audiences, he was able to tell them of the absolute success of this boiler during a month's run under ordinary working conditions, and a run made without the slightest hitch. For something distinctly new as was this boiler, the last-named fact is one upon which the joint workers are to be congratulated in the same terms as the congratulations upon the results of the month's run, which were in excess of those that experience under the Armley conditions had provided. "I want," says Dr. Bone, "no more demonstration of the validity of my views on "surface combustion than this boiler." An absolute satisfaction underlies these words.

The new boiler was described in the American Gas Institute lecture, and that and some other parts of the lecture are reproduced in other columns to-day, together with illustrations of the boiler. We have so long become accustomed to the forms of horizontal and vertical boilers—the former with their large settings, furnaces, chimney shafts, and specially provided habitations—that the stumpy cylindrical boiler now before us, looking much like a large circular station meter, seems almost ludicrous, and especially when the duty it can render is considered. It asks for a small space, and just the most convenient space that circumstances dictate; and it claims none of the immovable equipment of the large horizontal steam-boiler. This particular boiler is 10 feet in diameter, and only 4 feet deep; and it contains 110 tubes packed with the granular refractory material. The boiler is worked under suction, with coke-oven gas at 2 inches pressure, mixed with the proper proportion of air from the outside atmosphere. The boiler is quick-acting; and, with the products of combustion carried forward for raising the temperature of the feed-water, a very high thermal efficiency is obtained. This is shown by various facts—one being the average low temperature (187° Fahr.) of the waste gases leaving the feed-water heater. With the transmission of upwards of 90 per cent. of the net heat of combustion to the water, no challenge has yet been heard to the claim that the system stands unrivalled in steam-raising.

More information on this point and on other details can be gathered from the lecture. And further interest is to be found in the investigation made into the application of the principles of surface combustion to metal melting. When it is stated that these investigations show that, with town gas at 2s. per 1000 cubic feet, fivepennyworth of gas will melt a ton of lead, sufficient has been said to induce reference to the lecture itself for further particulars. We are moving forward now into the experience of the practical applications of surface combustion; and this experience will step by step decide the position that this new method of heating is to take in the world's work and affairs.

Technical Assistants' Pay—A Very Real Grievance.

We hear there is extant a not inconsiderable amount of feeling on this subject. Attention was directed to it in our columns on April 18 last (p. 157); and we are more than ever persuaded that many technical assistants in the gas industry have good cause of complaint as to the remuneration that is considered sufficient for their services. They are told, and fully realize the truth of it, that the responsibilities of the gas engineer and manager are increasing. They spend some years without, or practically without, monetary reward in training; and afterwards much more time is expended, and energy put forth, in storing up technical and commercial knowledge and facts that are useful—not only to them, but to the undertakings by which they are engaged—in their positions as assistants, and that will be still more valuable in the days of full responsibility. But after all this effort, and expenditure of time and money, it is very disappointing to find that the services of the technical assistant are assessed by Committees and Boards of gas undertakings, in so many cases, at such low figures—at no higher figure in numerous instances than the services of the members of the clerical staff, who, practically speaking, have not expended anything to qualify for their appointments. With the clerk it is mainly a question of experience; with the technical assistant, it is something much more. We do not want to see the salaries of the clerical staff cut down; but we do desire to see technical work, merit, and responsibility placed on a higher plane in regard to reward. There exists in this matter a very real grievance. But we appreciate fully, as is indicated in one private letter received within the last few days, the difficulty of assistants in bringing the matter prominently forward.

In the future interests of the gas industry as a whole, and for the encouragement of the technical assistants, more serious consideration should be given to this question. It is one that should claim the interest of the President and Council of the Institution of Gas Engineers; and we do not see why the junior organizations should not address a joint memorial to the Council (not necessarily signed by individuals, but by the Associations as bodies), asking whether something cannot be done—say, through a circulated recommendation from the Council on the subject, or in some other way—to make technical merit and work weightier factors in the determination of the remuneration of gas-works staffs than they appear to be to-day in such a large number of cases. We feel sure in the President (Mr. R. G. Shadbolt) and the existing members of the Council, the juniors would find sympathetic friends. Whether or not this suggestion is acceptable to the Junior Associations, our columns are at their service for the expression of views relevant to this or any other aspect of the subject; and any desire for anonymity will be respected, so long as the condition is observed that the names and addresses of the writers are forwarded to the Editor. The grievance is not a small one; and it is genuine. But there are difficulties that are great because those chiefly concerned are the occupants of junior offices. It is because of these difficulties that, if there is any desire to ventilate the subject, the columns of the "Journal" are available as suggested—in all cases, the letters being subject to the Editor's approval. Meantime, is there any senior member of the Institution whose assistants are well paid, or who is independent of official position, who will offer to take up the championing of the cause in this particular of the assistants? It is not a matter for treatment on individual cases; it is a question that should be taken up as a general matter of policy and justice.

The Consulting Engineer's Preserves.

We have yet to ascertain the precise usefulness of the new Association of Consulting Engineers. It is quite a considerable time since the movement commenced for the formation of this organization; and it has been long in the incubation stage. Now, at length, it is to be formally inaugurated on Jan. 15. The principal work of the Association will be, we take it, to attempt to create strongly barricaded preserves for those who are consulting engineers, and who are eligible for membership, with the view of keeping outside the select circle those who are not fully in practice as consultants. It may be supposed that membership is to be the hall mark of the genuine consulting engineer; but it will not in any way attest the qualification of the consultant. He will be known under the reign of the new Society just as much in the future as in the present and the past by the fruits of his

work; and the whole membership roll, however formidable, will not be able to effectually stand between consulting work and talented men who may not be in practice solely or even mainly as consultants.

There is to be only one class of member. The first condition of membership is that the candidate shall be in practice as a consulting engineer either individually or as a partner in a firm of consulting engineers. Determination as to whether his standing is of a nature entitling him to membership is to be left to the Committee of the Association. It will have to be a very strong Committee who will deal with such a delicate matter as this. Some such judicial body to consider applications for membership is required; but if membership is to confer any particular credentials in the consulting world, then we do not envy the Committee their work of acceptance or rejection. At the best, the Committee's opinion as to professional standing is a vague and unstable basis upon which to come to any conclusion as to eligibility, and perhaps in cases may inflict injustice. We could not see the value of the Association some time since; the rules have not carried us any farther on the road to conviction; and therefore we must wait and see whether the history of the Association that is about to commence to be made will better reveal the necessity and usefulness of the new body. There are among the rules those that are to regulate the ethical conduct of the consulting engineer. Honour has its unwritten laws; but apparently there have been experiences (even among consultants) that suggest the necessity for such rules. Again, will the Committee of the Association be strong enough, on proof being brought to their notice of breach of conduct rules, to extinguish the membership of the offending consulting engineer? There are some things that always seem to hold in them an element of doubt; and this is one.

Natural Gas in America and Canada.

Spasmodically information is published regarding the marvellous natural gas resources of the United States and Canada; but from the information afforded, one cannot, situated at a distance, adequately grasp its full importance, though generally able to appreciate Nature's benevolence to those regions in a position to make use of such a gas, conveyed to them at considerable pressures, and having a calorific power of about 1000 B.Th.U. The writer of the article on the subject in last week's issue (p. 899) was Mr. H. King-Hiller; and he gave, in a compressed form, just the information, free of a heavy weight of detail, that enables one to obtain a general idea of the value, position, and operations of the natural gas industry. There are not many British gas engineers who have had the good fortune to be entrusted with a mission that has necessitated a journey of investigation through the Pennsylvanian and Canadian gas-fields. That has been Mr. King-Hiller's good fortune; and the digest of salient features of the inquiry that was published last week has imparted to gas engineers at home some of the interest that awaited the traveller at every stage of his journey.

The Consumption of Nitrate of Soda.

The European consumption of nitrate of soda for the past twelve months, it is stated by Messrs. W. Montgomery and Co., in their customary report, amounted to 1,696,000 tons, as compared with 1,651,000 tons in 1910; this being an increase of 2¾ per cent. With 550,000 tons, against 501,000 tons (or an increase of 10 per cent.), for the States, and 103,000 tons, against 89,000 tons (or an increase of 16 per cent.) for all other parts, the world's consumption for 1911 is brought up to 2,349,000 tons, as compared with 2,241,000 tons in 1910—this representing an increase of 4·82 per cent. The increases in consumption are by no means evenly distributed over the European countries—in fact, Germany actually records a decrease of 3½ per cent., Belgium shows an increase of 7¼ per cent., France of 3¾ per cent., Holland of 7½ per cent., the Italian and Austrian ports of 12 per cent., and the United Kingdom exhibits an improvement to the extent of 10 per cent.—the figures being 132,000 tons, as against 120,000 tons. The course of prices the last six months has, we are informed, for the most part been steadily upward, with at all times a strong undertone. Early in July the value of arrived cargoes was about 9s. per cwt., cost and freight, while October-December sailings were quoted about 9s. 3d. per cwt.—a gradual improvement leaving the prices at end October and early November at 9s. 3d. for the former, and 9s. 6¼d. to 9s. 7¼d. for the latter positions. During the past few days, 9s. 4d. per cwt. was accepted for a November sailing cargo. The production for the past twelve months (estimating that for December at 4,900,000 quintals) amounted to 54,880,000 quintals. This compares with 53,596,000 quintals, and so exhibits an increase of 1,284,000 quintals, which is equal to 58,000 tons. The feature of these figures is the proof which they furnish that the increase in production has been slowing-down—recording, as they do, a gain of only 1,284,000 quintals, as compared with an increase of 7,600,000 quintals in 1910. Stocks in Chili to-day amount to 10,400,000 quintals, against 9,909,000 quintals a year ago; while those in Europe now total 479,000 tons, against 314,000 tons at the end of 1910. This means that the visible supply for Europe stands at 1,047,000 tons, as compared with 969,000 tons twelve months back.

Local Taxation Statistics.

The series of Blue-Books containing the Local Taxation Returns for the twelve months ending March 31, 1910, is making its appearance much more promptly—or, shall we say, much less slowly?—than has been the case with the statistics for previous years, though on the last occasion there was also a good deal of improvement in this respect. The gain in regard to the date of issue this time, however, it should be pointed out, has only been secured by the sacrifice of what has been an exceedingly valuable feature of preceding Blue-Books dealing with this involved subject. What is meant by this remark will be understood from the following note which was appended to Part I. of the returns for the year 1909-10: "It has been the practice for some years past to prefix to the abstracts of account in each part explanatory memoranda, summarizing the particulars contained in the abstracts. On the present occasion—*i.e.*, in the several parts relating to the year 1909-10—memoranda are not included. The object of the omission is to economize labour, and so expedite the issue of the returns as a whole." Whether the loss of the summary is compensated for by the gain in time of publication, those who have to study the accounts must be left to judge for themselves. They will find that, under the new conditions, the extraction of any useful information from the mass of tabulated figures is a matter calling for considerable labour—which is evidently just what has been the experience of the Local Government Board officials themselves. Part V. of the Blue-Book for 1909-10 is divided into two portions—one dealing with the accounts of the councils of boroughs (other than metropolitan boroughs), and the other with the accounts of urban district councils (other than town councils); and it consists of over 300 foolscap pages of figures.

Outstanding Loans.

In another part of this issue, some figures are given from the portion of the Blue-Book which deals with the accounts of the 327 boroughs (other than the Metropolis); and a moment may be spared here to note some of the principal features of the outstanding loans at March 31, 1910. Twelve months earlier, the £250,000,000 figure had been passed; and at the end of the period now under review the total had reached nearly £252,000,000—which compares with £246,500,000 for the year 1907-8, and £232,000,000 for 1904-5. To place against the first-named sum, however, there is shown in the accounts an amount of some £17,500,000 standing to the credit of sinking and other funds which are applicable to the repayment of loans. In the accounts, four classes of "reproductive" undertakings are separately dealt with; and these account for close upon one-half of the outstanding loans. The concerns and the amount of the loans are: Tramways and light railways, £22,424,596; water, £62,178,296; gas, £19,174,973; electricity, £21,338,664. In no instance is the amount much larger than was the case twelve months before, while that under the head of gas is actually somewhat less. Since 1904-5, as a matter of fact, the outstanding loans on borough council gas undertakings have decreased by some £600,000. Among some of the other important purposes for which money is owing by the councils may be mentioned £27,693,698 for public roads and streets, £20,934,758 for sewerage and sewage disposal works, and £20,063,236 for education.

Profits and Losses.

One of the features of these annual statistics of the financial transactions of the borough councils is the information afforded

as to the profits or losses realized on the working of the four classes of "reproductive" concerns named above—that is to say, tramways and light railways and gas, water, and electricity undertakings. On one side of the accounts there is a column headed "Surplus revenue transferred to other accounts of the councils in relief of rates;" and for the undertakings referred to the total sum so dealt with in the year 1909-10 was £1,024,782. This is about £88,000 more than was the case for the preceding twelve months, when, however, the total was £115,000 less than that transferred in 1907-8. As to the column on the other side, "Sums transferred from other accounts of the councils to meet deficiencies in revenue," the total of this on the present occasion is £338,302, which compares with £331,988 for the preceding year, and £372,076 for 1907-8. It will be noticed that gas is still a long way ahead of the other undertakings as a "rate reliever," with a transfer of £490,470 (or nearly half the total profits transferred by the four classes of undertakings); while it also holds the most enviable position on the other side, as having been responsible for an absolutely negligible deficiency which had to be made good from other accounts of the councils. In no less than fourteen cases sums of £10,000 or over were contributed by gas undertakings in relief of the rates; while the few concerns on the other side only show deficiencies of less than £3000. In the matter of water undertakings, the profits transferred (£110,750) are less than one-half as much as the deficiencies which had to be made good (£231,353); while from electricity undertakings the rates benefited to the tune of £119,084, and, on the other hand, they suffered to the extent of £42,995.

In the "JOURNAL" for the 19th ult. (p. 815), reference was made, on the authority of the "Chemical Trade Journal," to the Schnabel method of employing gas or gas-air mixtures for heating. It has been pointed out to us that this so-called "new" method is identical with that originally invented in Leeds by Professor Bone and Mr. M'Court, whose inventions were, we are informed, made at an earlier date, and have been fully protected under a number of patents which have been already granted in Great Britain (1909-10), and also granted, or are about to be, in various other countries, including Germany, under the International Convention. After careful inquiry in Germany, on behalf of Messrs. Bone and M'Court, by an eminent firm of patent agents, they wish to state that, to the best of their knowledge and belief, the inventions in regard to the industrial applications of surface combustion are of prior date to the corresponding inventions of Herr Schnabel.

Coke-Oven Gas for Lighting in Germany.—In an article on "The Bye-Products Markets in 1911," in the last number of the "Iron and Coal Trades Review," reference is made to the fact that Great Britain possesses several coke-oven installations making lighting gas for public and private use; and it is pointed out that this phase has developed rapidly in Germany, as the following figures (in cubic metres), giving the approximate annual sale of this gas, will show: In 1906, 2,068,709; in 1907, 2,768,344; in 1908, 11,990,108; in 1909, 24,763,638; and in 1910, 42,551,609. The revenue from this source, computed in terms which leave a margin to distributors quite equal to that which they now earn, is, the writer says, such as to form an appreciable and welcome addition to the revenues of blast-furnaces.

Staff Changes in the Imperial Continental Gas Association.—Mr. Willem Jean Brender à Brandis, Chief Engineer of the Antwerp establishment of the Imperial Continental Gas Association, who retired on a well-earned pension at the end of last year, after upwards of twenty years' service, was at Christmas presented with a silver inkstand and pair of candlesticks, as a mark of the personal esteem in which he is held by the Board of Directors. He has also been the recipient of testimonials from his colleagues and from the employees at the Antwerp Gas-Works. He entered the service of the Association as Chief Engineer at Haarlem in August, 1891. In June, 1901, he was appointed Chief Engineer of the Antwerp station; and it was during the term of his managership that the new gas-works at Hoboken, on the Scheldt, were erected and put in action. As successor to Mr. Brender à Brandis, the Board have appointed Mr. A. F. P. Hayman, whose career in the Association's service, extending over a period of thirty years, commenced at the age of eighteen, when, in July, 1881, he was appointed as pupil engineer at Lille. He became Assistant-Engineer at Haarlem in June, 1884, and after five years' service there was transferred, in May, 1889, to Brussels. He went to Berlin in 1898, and was made second Assistant-Engineer there in December, 1903, and Chief Assistant in September, 1904—being transferred thence to Antwerp in April, 1910, as Chief Assistant to Mr. Brender à Brandis, whose place he now takes. Mr. Hayman has been present at many meetings of the Institution of Gas Engineers, and is well known in England.

ELECTRICITY SUPPLY MEMORANDA.

A Review of the Past Year.

As we glance back, it must be confessed that the electric supply industry has evinced a considerable amount of activity during the past year—not so much in actual business as in the exercise of highly inflamed imaginations. We warrant that it is not far from the truth to say that never before have the attacks on the gas industry from electrical people been fiercer or more hare-brained than in the course of the year just closed. It is a compliment to the gas industry perhaps that the assaults on it have to be so fiercely conducted, and that, above-board procedure failing, it is felt necessary by not a few electrical folks that they should debase themselves for commercial ends by adopting imputation and slander, and always decline to justify themselves on being invited to do so. Several times during the year, we have challenged various maligners of the gas industry and of its staple product; but the cowardice that is exhibited in taking up the challenge is as striking as are the disseminated falsehoods. The two characteristics are fit companions. There has been much display of this kind in the course of the year; and as the managers of the electrical industry look back upon these things, those of them who carry themselves above mendacity and pusillanimity, cannot regard with any feelings of pride the doings of some of their colleagues. Assertion of the kind should be capable of ready proof. If ready proof is not forthcoming, it does not say much for the honour of the men who make use of the assertion. Allegation and innuendo concerning the gas industry, however, have been reduced to platitude of the weakest order; and we are afraid that much of it has been set floating by irresponsible or unscrupulous persons, and that many others who have made use of one or other, or both, have simply clutched hold of them, and continued their circulation without any thought or knowledge as to their truth or otherwise.

Many of the electrical advertisements published in the course of the year have been of a perfectly outrageous nature. Of these the one circulated recently in a Manchester paper was an excellent sample of both meanness and distortion. The author or authors hid themselves behind the shield of anonymity; and the British Commercial Gas Association gave the scandalous advertisement the lie direct. The Electricity Publicity Committee (whose operations are not receiving universal electrical approval) continued their work by the issue of pamphlets, advertisements, and through the Press. Makers of electric appliances advertised—sometimes extensively; but often seeking to injure the gas industry by, to those competent to judge, bare untruths. It is very remarkable how the stock assertions have done duty so long, even to the extent, as was shown last week, of raking up work done under old conditions (totally different conditions from those now obtaining) by men who were laid to their final rest twenty or more years since. The record is very musty, and worn by usage. The Electricity Publicity Committee have a good collection of ancient and obsolete matter that does not apply to the gas industry to-day, if ever it did, but is nevertheless made use of by the electrical industry in the cause of commercial expansion. This literature has been receiving wider circulation; the Committee having extended their operations to the whole of Great Britain. As seen elsewhere in the current issue, they are attempting to increase their influence. It is a strange reflection, and the matters are irreconcilable, that (while the gas industry has been substantially increasing its business during the year) several silly articles have appeared foretelling its approaching extinction; and yet despite this electrically accepted declaration, the desire to malign the gas industry and all its works, and to strengthen the electrical industry in a manner to make its attacks still more formidable, has been more feverish in character and more persistently in evidence. Here we have strangely mixed contentions and desires. The electrical industry, however, is growing quite famous for its eccentricities.

It is failure to expand at the rate hoped for in the line of the heavy priced units for lighting, that has caused so much antagonism to the gas industry. With economy, efficiency, and reliability on the side of the latter—all three merits that the public can appreciate—the electricity industry has severely turned once more to the health argument; and this is where the grossest falsehood is found, and found more than ever. Freely but loosely the "poisonous" emissions of gas are spoken of. But we cannot (though we have tried many times during the year) get electricians to give them a name, nor to tell us what these vague assertions represent quantitatively. There is no getting our detractors down to anything definite. They appear to be too crafty for that. So extraordinarily inflated has imagination grown that one Percy Good was allowed by the "Electrical Review" to seriously suggest in its columns that gas should only be sold in bottles labelled "poison;" and the same individual made some extraordinary and very stupid calculations as to the consumption of air for the combustion of gas. How was it the "Electrical Review" allowed nonsense like this to appear in its columns? Were the Editors ignorant of the facts? Or what was the cause that permitted the publication of the article? Then among other remarkable performances, we had Dr. Collier, the Medical Officer to the Hammersmith Borough Council (owners of the local electricity supply), urging that electric light should only be used by householders, as the products of combustion contributed to the production of consumption.

Another exceedingly singular thing is that, since the advent of the public supply of electricity, Nature's ordering of some things

has been totally reversed, for, it would seem, the sole reason of putting gas at a disadvantage and electricity at an advantage. This, at any rate, is what electrical writings would have us believe, through the repeated contradiction they offer to natural causes and effects. In one paper by a prominent electrical engineer, the author made air perform the most extraordinary evolutions in order to "prove" the case against gas; while, on the other hand, Mr. S. L. R. Price, in an address at Dublin, showed how, under ordinary circumstances in coal and gas heated rooms, the air was changed several times an hour through perfectly natural causes. Dr. Toogood, at the Lewisham Infirmary, proved that with simply an outlet near the ceiling, and the use of gas, the wards were kept well ventilated, lighted, and warmed; while it was shown in the electrically-lighted and electric-fan ventilated theatre of the Institution of Electrical Engineers that the ventilation was not efficient until alteration was made. Complaint was also made regarding the ventilation of the electrically lighted Council Chamber at Sheffield. Among other depraved behaviour of gas, it is freely alleged to be guilty of absolute gluttony with regard to the oxygen of the air; one of the baseless assertions circulated during the year being that one gas-flame (dimensions not stated) consumes as much oxygen as five or six persons. The voracity of gas for oxygen is such that one learned electrician attributed to this atmospheric robbery by gas the pale faces of the residents in London. Of course, in the "scientifically trained" electrical mind, there is no form of combustion that requires so much oxygen as gas; and, it is quite evident that (also in the electrical mind) Nature did not make provision in its beneficient schemes for the combustion of gas, so that gas is an intruder in the world's affairs, economies, and conveniences, though Nature gave it birth. We have, indeed, had a large stock of electrical misrepresentation and fiction to deal with in the course of the year.

There has been less talk about the cost of the two illuminants. Facts are facts. One fact that is penetrating the brain of the electricians is that the inverted gas-burner is a practical advance, in economy and efficiency, on the old vertical burner; and a significant thing is that they still prefer to found their computations of costs on old type vertical burners. In one electrically published statement that came before us during the year incandescent gas-burners were only credited with an efficiency of 5 candles per cubic foot of gas! There is another matter that has brought them up sharply in the comparison of costs for private lighting. It is that, in the competition with gas for public lighting, they have to come down to prices as low as 1d. or so, in order to compete with the inverted gas-lamp in the streets; and then the transaction in many cases must—labour, maintenance, and all taken into account—be profitless. In face of this, the makers of metallic filament lamps and electricity undertakings have continued to advertise the now famous legend, which electricity consumers discount among their friends, that "Electricity is Cheaper than Gas." Metalite Limited was guilty of publishing statements of a remarkable order in this connection; but the Company refrained from crossing swords on the subject. A good deal has been heard in the course of the year about the glare of the metallic filament lamps; and their effect upon the eyes. Professor Marchant, before the Liverpool Engineering Society, spoke of the advantage of the inverted incandescent gas mantle over the electric lamp for desk work, owing to its uniform illumination. Twice during the year the prices of metallic filament lamps dropped; and some makers came down a third time. Various reasons for these reductions were advanced—one being that the manufacturers were anxious to assist the electric supply industry in their competition with gas. As to the boasted life of metallic filament lamps, tests, under makers' supervision or other special conditions, gave some long life records, and were duly noticed in the Press. But the average life of the lamps in everyday use does not anything like approach these "testimonials. Mr. Leonard Murphy, of the East London College, wrote to the "Electrician" saying "it must be admitted that its [the metallic filament lamp's] extreme fragility, coupled with its high first cost, cause many to regard investment in the new type of lamp as a risky speculation." Mr. Leon Gaster, before the Select Committee on Misrepresentation in Trade, stated that the ratings marked on electric lamps were in many cases incorrect; and he had tested several batches of lamps the life of which, supposed to be 800 hours, was actually as much as 40 to 70 per cent. below this figure. The Ironmongers' Federated Association were also in the spring urging a larger discount to compensate them for breakages of the lamps in transit.

Flame arc lamps have chiefly come before us during the year in connection with the competition for outside shop lighting. The "Engineering Correspondent" of the "Daily Telegraph," who is an Assoc.M.Inst.E.E., in an article towards the end of June, remarked on the subject of these lamps: "It is perhaps well to issue a word of warning that many of the arc lamps sold as being of a certain candle power only give that amount of illumination in one special direction." A large amount of information as to the costs of these lamps has been given in the controversy in our columns with the same gentleman. The large adoption of high-pressure gas-lamps for outside shop lighting has caused electricity authorities to consider what can be done to stop this turn of the tide to the new high-power gas units for shop lighting; and several borough authorities—Islington, St. Pancras, and Croydon among the number—have put forward special terms for flame arc lamps for this purpose. Whether the prices are paying ones is another matter; the boroughs are far from agreement as to what the prices should be. The anxiety displayed over the subject was mirrored by the discussion, initiated by Mr. A. H. Seabrook, on the question at the annual meeting of the Incorporated Municipal Electrical Association.

The discussions on the subject of electric cooking and heating are so fresh in mind that there is no need to expatiate on them at length. But a few references may be made. For these purposes electricity is being freely offered at 1d. per unit. Bradford, Luton, and Southampton are even offering it at ½d. per unit; and Accrington at ¾d. The gas industry supply so many thousands more B.Th.U. for a given price, that it is still generally retaining for cooking and heating its full lighting prices. The electricity industry has not only got down to these low prices, but they admit, in relation to the electric cookers at any rate, that the efficiency is already so high that there is barely any margin left for further improvement; while the efficiency of the gas-oven is so low that there is a big field within which to secure further economy. On the other hand, after thirty years' use of the gas-oven, the electricians have discovered that the population of the country ought to have been practically extinguished through the gas-poisoned food that they have been eating; and, further, if electric cooking is now adopted (the population having survived the terrible ordeal through which it has been passing), the country will become very wealthy, through the retention of the water in meat cooked in the midst of the vapours of its own making. The fairy tales that have been heard have been highly entertaining. But there are electricians who look on the practical side of these things. Electrical kitchen apparatus, they say, must be able to withstand the same conditions as the gas-cooker. Structural robustness, wear and tear, and reliability are not negligible factors. So important are these factors that Mr. Seabrook, who never admits more than he can help to the disadvantage of electricity, says the hire of apparatus is not a good business deal unless a very high rental can be obtained. The question, too, of high transient loads occasioned by electric cooking, other practical minds (we really do not think they need worry at present) suggest will mean heavy capital expenditure on cables, which should be borne by the charge made for the electrical cooking. Professor Fleming, too, is solicitous over the moral and other effects on the cook of electrical shocks. So we sit and leisurely watch the fun. Concerning electric radiators, the year has seen nothing that is really new, excepting fresh appreciation on the part of the public that the modern gas-fire is the best possible successor of electric radiators when a good heat is required. As for the use of electricity for water heating for household or any other purpose, cost and time occupied are on a scale that to contemplate them unfailingly raises a smile and ridicule.

Wiring and equipment have again been fairly prominent. The Institution of Electrical Engineers issued their revised rules. Some electricians applauded a little relaxation here and there; while others protested against this—safety, in their view, being of paramount importance. On the other hand, the Phœnix Fire Insurance Company tightened-up their rules after the financial experience they had through the Clapham fire. But what is the use of all this regulation when it is so largely violated? In his annual report, Mr. G. Scott Ram, the Chief Electrical Inspector of Factories, made some fairly severe—but not too severe—strictures on those who neglect the electrical rules laid down for their guidance. Free wiring raised its head now and again; and the Eccles Electricity Department showed that last year it made on the cottage property it had wired, with a fixed price per week, an average profit in the year of 2s. 8d. But there were not sufficient details vouchsafed to ascertain how much of the 2s. 8d. was real profit. The Municipal Electrical Association have introduced a Bill in Parliament for the purpose of conferring upon electricity supply authorities free-wiring and other powers. The requirements are broad and unusual; and the measure in nearly every part is highly contentious. A guarantee fund of £3000 has been requested; so far, it appears, only about £1000 is the sum in sight.

The question of charges for electricity has come occasionally to the front. It is still thought that fresh schemes of charging are necessary to overcome the restrictions from which electricity suffers; and there has been a large adoption of such systems as the "Norwich" and the "Telephone," in order that, after the payment of an advance lump sum, units may be had by the consumer for any purpose at (say) 1d. apiece—thus doing away with duplicate wiring and meters. But already it is found that there is a fairly rigid line drawn between consumers who can afford prepayment in lump sums and those who cannot. Those who can afford lump sum payments are just those who can afford duplicate wiring and duplicate meter-rents. Such is the irony of fate. Prepayment electric meters are not doing very well, and they cannot count numerous friends. They are altogether too complicated, and subject to organic and functional disorders that have given them a bad name. The ordinary meters, too, year by year, are looked upon more and more as a necessary nuisance; and so comparatively short is their average life that electricity authorities are commonly now adopting the advice of the Local Government Board, and charging new meters to revenue and not to capital. There seems to be a great distaste on the part of electrical people to their meters being tested and sealed by the proper authorities. In Manchester, the City Justices made a suggestion to this end, but were met with hostility from the Corporation Electricity Department.

Street lighting has been a luxuriant subject of discussion; but the sketch of the year's ory may be left at the account on

p. 888 of last week's issue. There was a great deal of evidence advanced during the year as to the unfair treatment by municipal electricity owning authorities of private gas enterprise in regard to street lighting and the illumination of public establishments, largely through the influence of members of electricity committees serving also on other committees or other local bodies. Some of the municipalities who are the worst sinners in this respect are those whose profitless, or almost profitless, concerns induce them to run beyond all commonsense consideration of the question.

The great event of the year for the electricity industry (which, before it happened, one writer of electrical fables said would be regarded with dread by the gas industry) was the exhibition that failed in its main purpose at Olympia. Despite all the efforts in the Daily Press and in other ways, the public were not attracted to the show; and there was great lamentation over the fact.

It is clear that many electricity departments are looking with a large amount of unfriendliness on private gas-driven generating plants, which are giving their owners energy for all purposes at low prices per unit—lower in some cases than the ordinary power tariffs of electricity undertakings. The reports on breakdowns of electric motors show that their trustworthiness is not improving; and one insurance company state that they find the cost of repairing breakdowns is upward bound.

There were several recorded failures of electric supply during the year; and probably many more unrecorded. The following are samples: On Jan. 6, during the examinations at the Royal College of Physicians and Surgeons, Thames Embankment; on Feb. 12, there was one at Bradford; on Feb. 24 at Southend; towards the end of March, at Sheffield; on April 9, at St. Woolos Church, Newport, Mon.; during May, at Woking; on May 3, at Hindhead; early in May, at Torquay; on May 16, at Aberdeen; August Bank Holiday at Yarmouth, and at the Pier Pavilion, Herne Bay; on Sept. 12, in the Blackwall Tunnel; on Oct. 29, at Eastbourne; on Nov. 1, at the Blackpool Town Hall; on Nov. 4, at Cardiff; also in November at West Ham; on Dec. 14, at the Burnley County Court; and at Worthing, consumers have also been complaining of failures. Part of the Coronation electrical illuminations failed to give a good account of themselves at Ilkeston. The "Nursing Mirror" reported a failure in Yorkshire that occurred during a surgical operation. On March 21, we reported on a good deal of trouble that St. Pancras had experienced through cable faults.

At the beginning of the year the trouble over fires at drapers' shops had not abated. The "Drapers' Record" made some investigation into two or three fires that occurred at High Road, Leytonstone, towards the end of December; and the same paper gave information as to the elaborate precautions that were taken in the re-wiring of the premises of Messrs. Arding and Hobbs at Clapham. The Drapers' Mutual Fire and General Insurance Company thoughtfully sent out a few hints as to the management of electrical installations in connection with the epidemic of fires at drapery establishments. The fire that occurred at a shop at Maidstone at the end of the previous year resulted in the death of a lad employed on the premises. Early in January a fire was caused at Camden Town through the fusion by an electric cable of a gas service-pipe; a similar case was reported from Montreal [see "JOURNAL," Aug. 29, p. 552]; and another occurred at Edinburgh on Nov. 9. After the Carlton Hotel fire in London in August, the Buildings Committee of the London County Council announced that they were considering the question of compelling all premises in London where hotel or sleeping accommodation was provided for the public to put electric wires in steel casing. Electric wire fusions are stated to have caused fires on Jan. 3, at the Acton Garage of the L.G.O.C.; on March 28, at the New York State Capitol; on April 6, at a studio on the New Forest Estate of Lord Montagu of Beaulieu; on May 2, at the Imperial Hotel, Barnstaple; on May 7, at a Leeds clothiers' shop; on Aug. 7, at the house of Mr. Richards, Suffolk Road, Lowestoft; on Aug. 9, at 4, Soho Street, W.; on Aug. 14, at Sutton Hall, near Thirsk; on Aug. 23, at the shop of Mr. C. G. Child, of High Street, Birmingham; on Sept, 4, at the Oxford Place Chapel, Leeds; on Oct. 7, at the Mossend Iron and Steel Works, Bellshill; on Oct. 11, at 12, West Smithfield, and at New Street (Kennington) Station; on Oct. 17, at the shop of Mr. W. Docker, Albany Road, Cardiff; and on Dec. 3, a marquee at the Punjab Camp at the Durbar was destroyed. Lightning, electrical installations, and fires combined to damage Trinity Church, Marylebone, and the upper floor of the Royal Exchange in June last. At the Middlesbrough Picture Palace Hippodrome, on March 27, there was a fatal stampede of the audience through the alarm occasioned by the fusing of a wire supplying current for operating an electric-fan. In May, there was the tragic occurrence at the Edinburgh Empire, whereby artistes and employees lost their lives, and much damage was done to property. The London Fire Brigade report was dealt with in the "JOURNAL" for March 21 last. It presented some interesting facts, as did also the report made by the Acting Electrical Engineer to the Corporation of the City of London (Mr. H. R. Mott), noticed in our issue for Dec. 19, p. 813. Many warnings have been given during the year as to the use of flexible wires; and at the Olympia Exhibition and elsewhere, hand fire extinguishers for the use of electricity consumers were well advertised. On Nov. 7, the British Thomson-Houston's premises in Upper Thames Street, E.C., sustained serious damage through fire; but the electrical papers did not announce the cause. On Nov. 23, there was a disastrous explosion in the Strand due to the fusing of an electric cable, and gasification of the bitumen covering

Due apparently to the same cause, on Nov. 26, an explosion occurred at Nottingham which wrecked the Albert Hotel. A correspondent in "The Times" in November called attention to the fire dangers of electric bed warmers. With this warning to elderly people who are not so agile as they once were, we will close this review of the year's electrical events as they more directly touch upon the gas industry's interests.

GAS STOCK IN THE PAST YEAR.

GAINS AND LOSSES.

ACCORDING to usual custom, we publish a table showing the closing prices of gas stocks and shares at the end of 1910 and the end of 1911, with the respective gains and losses in value. Among the gainers, the most conspicuous group is the Suburban and Provincial. The shrinkages in 1911, as in 1910, are mostly to be found in the values of debenture stocks, which have suffered during both years in common with other high-priced securities of their class.

[The weekly Money Article and Stock and Share List will be found on p. 44.]

GAS COMPANIES.	Prices on Dec. 31, 1910.	Prices on Dec. 31, 1911.	Gain or Loss.
Alliance and Dublin, Ordinary	80—83	79—82	−1
Do. 4 per cent. Deb.	96—98	93—95	−3
Bombay, Limited	6⅞—6¾	6—6⅛	−⅝
Bournemouth, 10 per cent.	28½—29¼	20—30	+½
Do. B 7 per cent.	16½—16⅝	16½—16⅝	..
Do. Preference 6 per cent.	14¾—15¼	14¼—14¾	−½
Brentford, Consolidated	252—255	256—261	+5
Do. New	193—196	198—203	+6
Do. 5 per cent. Preference	120—122	120—122	..
Do. 4 per cent. Debenture Stock	97—99	97—99	..
Brighton and Hove, Original	217—220	217—222	+1
Do. A Ordinary Stock	158—161	156—159	−2
British	44—45	44½—45⅛	+⅛
Do. 4 per cent. Debenture Stock	..	92—94	..
Bromley, A 5 per cent.	119—121	127—132	+9½
Do. B 3½ per cent.	89—91	97—102	+9½
Do. C 5 per cent.	109—111	117—122	+9½
Do. 3½ per cent. Debenture	83—85	80- 82	−3
Buenos Ayres, 4 per cent. Debenture	95—97	94—96	−1
Cape Town and District, Limited	3—4	2—3	−1
Do. 4½ per cent. Preference	4⅛—3⅝	4⅛—3⅝	..
Do. 4½ per cent. Deb. Stock	88—90	78—81	−9½
Chester 5 per cent. Ordinary	109½—111½	111—113	+1½
Commercial, 4 per cent. Stock	106—109	110—112	+3½
Do. 3½ per cent. do.	101—103	105—107	+4
Do. 3 per cent. Debenture Stock	77—79	75—77	−2
Continental Union, Limited	86—91	85—89	−1½
Do. 7 per cent. Preference	134—136	132—134	−2
Derby, Consolidated Stock	122—124	122—124	..
Do. Debenture Stock	104—105	104—105	..
European, Limited	23¾—24¼	20—21	*
Gaslight and Coke, 4 per cent. Ordinary	105⅛—106⅛	104⅜—105⅜	−¾
Do. 3½ per cent. maximum	86—88	84⅛—86⅛	−1½
Do. 4 per cent. Con. Pref.	103—105	102—104	−1
Do. 3 per cent. Con. Deb.	78—80	79—81	+1
Hastings and St. Leonards, 3½ per cent.	93—95	94—96	+1
Do. 5 per cent.	..	..	..
Hongkong and China, Limited	17—17⅛	17—17⅛	..
Ilford, A and C	146—149	154—157	+8
Do. B	115—117	125- 128	+10½
Do. 4 per cent. Debenture	96—98	92—94	−4
Imperial Continental	185—187	190⅛—192⅛	+6
Do. 3½ per cent. Deb. Red.	94—96	90—92	−4
Lea Bridge Ordinary, 5 per cent.	121—123	125—130	+5½
Liverpool United A	220—222	219—221	−1
Do. B	164—165	163—165	−⅛
Do. Deb. Stock	102—104	100—102	−2
Malta and Mediterranean	4⅜—4⅝	4⅜—5	+⅛
Metropolitan of Melbourne, 5 p.c. Deb.	100—102	100—102	..
Do. Do. 4½ p.c. Deb.	99—101	100—102	+1
Monte Video, Limited	12⅛—12⅜	12 —12⅛	−⅛
Newcastle and Gateshead, Consolidated	101⅛—102½	101⅛—102	−½
Do. 3½ p. c. Deb. Stk.	90—91	85⅛—87⅛	−4
North Middlesex, 7 per cent.	13⅛—14⅛	14⅛—15⅛	+1
Oriental, Limited	137—139	134—136	−3
Ottoman, Limited	6¼—6½	6⅞—7¼	+⅞
Portsea Island A.	132—134	140—145	+9½
Do. B.	125—127	133— 38	+9⅝
Do. C	118—120	130—135	+13½
Primitiva, Ordinary.	7⅛—7⅜	7⅝—7⅞	+½
Do. 5 per cent. Preference.	5⅛—5⅜	5⅛—5⅛	−⅛
Do. 4 per cent. Deb. Stock	95—97	97—99	+2
River Plate, 4 per cent. Deb.	95—97	94—96	−1
San Paulo, Limited	15⅜—15⅝	10⅜—11	*
Do. 6 per cent. Preference.	11⅛—11⅜	11⅛—12	+⅛
Do. 5 per cent. Deb. Stock.	51—52	50—51	−1
Sheffield, A.	229—231	239—241	+10
Do. B.	229—231	239—241	+10
Do. C.	229—231	239—241	+10
South African	10⅜—11⅛	8—9	−2⅛
South Metropolitan, 4 per cent. Ordinary.	121—123	116—118	−5
Do. 3 per cent. Deb. Stk.	80—82	79—81	−1
South Shields Consolidated Stock	155—157	157—159	+2
South Suburban, Ordinary 5 per cent. Stk.	120—122	121—123	+1
Do. 5 per cent. Preference Stk.	120—122	117—120	−2½
Do. 5 per cent. Debenture Stk.	122—124	121—123	−1
Southampton, Ordinary	113—112	107—109	−3
Tottenham and Edmonton, A 5 per cent.	141—143	145—148	+4½
Do. B 3½ per cent.	113—115	115—117	+2
Do. 4 p.c. Deb. Stk.	95—97	94—96	−1
Tuscan, Limited	8⅜—9⅛	8⅜—9	−⅛
Do. 5 per cent. Deb. Red.	18—100	99—101	+1
Tynemouth, 5 per cent. maximum	114—115	114—116	+⅞
Wandsworth and Putney, B 3½ per cent.	142—144	142—145	+⅞
Do. 3 p. c. Deb. Stk.	73—75	71⅞—73⅞	−1⅛

* The ordinary shares of European and San Paulo, having been converted into other denominations, are not comparable with the quotations of 1910.

In the list of New Year honours conferred by His Majesty the King are knighthoods for Professor W. F. Barrett, F.R.S., of Dublin, and Dr. R. J. Collie. The name of the former has appeared from time to time in the "JOURNAL" in connection with his investigations into the subject of divining for water; and the latter is the Chief Medical Officer of the Metropolitan Water Board.

THE CONTRACT FOR THE GAS SUPPLY OF HANOVER.

A Twenty-five Years' Extension Secured by the Imperial Continental Gas Association.

To the making of new contracts and the extension of old ones by the Imperial Continental Gas Association there is no end. It is the most serious part of the diverse work that lays claim to the administrative ability and diplomacy of the Board—the concession system of gas supply on the Continent being altogether different from the comparatively simple statutory authorization and responsibility involved in gas supply in this country. A contract with the local ruling authorities on the Continent means a limited tenure, and a financial obligation through which, as a rule, the city or town derives benefit as well as the proprietors, and under which the funds for the amortization of the capital expenditure have to be provided during the life of the contract, in the event of this not being extended—a condition that the Association have experienced in the case of certain contracts of the first line. Hence the importance of new and the extension of old contracts. With unparalleled smartness in the matter of time, the contract for the supply of Hanover has just been extended from 1925 to 1950; and the conditions are of a nature that makes them highly interesting.

The Hanover station of the Association embraces in its area of supply the city and the town of Linden. But Linden (where by-the-by new works are being constructed with carbonizing plant entirely on the Dessau system) does not in any way come into question in the contract now under consideration—a contract for the supply of the town having been renewed (for 25 years) some few years since on somewhat the same terms as the Hanover one. As to Hanover, the position was year by year becoming a more and more anxious one, inasmuch as, under the current contract, in 1925 the whole business—including land, works, mains, everything—was simply to pass gratis into the possession of the Municipality; only the services, meters, and fittings on the consumers' premises being taken over at a valuation. These were the only parts of the Association's property in Hanover for which the Municipality would have had to pay. When these conditions of the old contract are considered in conjunction with others to which reference will be made presently, it will be recognized that the Association had not much ground upon which to bargain for a new concession beyond the year 1925, when, as things stood, they would have had to cede their ownership. But there was a way that will be vastly better than the surrender of the station in 1925, though time will have to show whether or not the station, under the new conditions, will prove quite as remunerative as hitherto. This will depend largely upon business development. The new contract has both its disadvantages and its advantages; and setting one against the other, the Association are to be congratulated upon having secured the gas business of Hanover until 1950 certain, though under revised terms.

This further contract for Hanover will stand as the most expeditiously performed piece of contract negotiation in the annals of the Association. It was only during the week ending Dec. 16 that intimation was received at the London Offices of the Association that, if the Chairman (Mr. J. Horsley Palmer) would visit Hanover, and discuss terms for a renewal of the contract, perhaps something might be promptly accomplished in the matter, but the condition was made that he should be armed with plenary powers. The Chairman lost no time. Friday, Dec. 15, saw him start on his mission; and three days later he had his first interview with the Stadt-Direktor Tramm and his colleagues. On Saturday, Dec. 23—eight days after Mr. Palmer left London—the Secretary (Mr. R. W. Wilson) received the intelligence that the new contract had been ratified by the Town Council. It ought to be acknowledged at this point that the courtesy of the City authorities in the matter was very marked. The Chairman was received with the greatest cordiality; and the negotiations were conducted in the most pleasant manner.

Under the circumstances of the old contract, it will be understood that the Association had to offer very high terms; and it is readily appreciated, too, that as ownership of the property in 1925 (as things stood) would have been vested in the Town Council, the Association have naturally had to pay a lump sum as (so to speak) the purchase price of the works and the business in 1925. This is the first condition. To put it briefly, the Association have agreed to purchase the works, rights, and privileges again for the 25 years succeeding 1925, for £500,000 (M. 10,000,000), payable in three instalments; the first payment of £200,000 to be made in April next. We have only to look at the balance-sheet to see a condition of solid finance that makes this payment a comparatively easy matter. The Association are able to pay the money out of their savings. Besides the amounts set out in the balance-sheet, they will have the moneys coming in from Vienna; so that there is no difficulty in regard to providing the money. In addition to the lump sum payment, the public lighting of the town will be given free; and this will cost practically £10,000 to £12,000 a year. Then some slight concession has to be made to the prepayment meter consumers; but that is practically a negligible quantity. Then comes another interesting condition. Under the current contract, the Association pay the Municipality a contribution at the rate of 3 pf. per cubic metre on all gas supplied for private lighting, which is paid for at the rate of 16 pf. per cubic metre. Upon all gas used, too, for purposes other than lighting—industrial, cooking, and heating purposes—for which 12 pf. per cubic metre is paid by the consumers, a contribution of 3 pf. is likewise made to the Municipality. Then after 1925, the Association will have to pay a contribution of 4 pf.; but no increase beyond this figure will take place unless (and this is important from the point of view of the proprietors) the consumption increases very considerably. The consumption now is 30 million cubic metres; and it has to reach 55 million cubic metres before (after the year 1925) any increased contribution, beyond 4 pf., is made to the Municipality; and then, with such an expanded business, there will be some amount of cheerfulness in complying with the condition.

In conjunction with this contribution to the Municipality, the Association have procured a considerable advantage, which will be appreciated by a very simple explanation. It has been mentioned that the contribution to the Municipality is 3 pf. on both the gas charged at 16 pf. per cubic metre for lighting, and on that charged at 12 pf. for purposes other than lighting. Recent years' increases in the consumption of gas have been (practically speaking) on the 12 pf. price; and this trend of the business is drawing the margin closer and closer to a net 9 pf. price. This is a condition that is not altogether pleasant to contemplate. The point is emphasized by noting how the total private consumption is to-day spread over the different classes of business. Of the total private consumption, 56 per cent. is used at the 12 pf. price for purposes other than lighting, 38 per cent. of it for lighting on the 16 pf. price, and 6 per cent. of it for the prepayment meter consumers. Consider the relation of the 56 per cent. to the 38 per cent., and that the former is a growing figure. This has an important bearing upon what ensues. What the Association have succeeded in doing is of considerable value—more so in fact than is apparent at first sight. Let us put it this way: The Association have secured the right to an average price, for all purposes, of 14 pf. per cubic metre, on which a 3 pf. contribution is to be paid to the Municipality until the year 1925; and this brings down the average to 11 pf. With the consumption under the present conditions extending on the 12 pf. business in the manner we have shown, the net average over the whole of the business, after paying the 3 pf., was trending gradually but surely nearer to the 9 pf. The higher average net price is the salvation of the whole situation created by the new contract; and that is one of the factors assuring a profitable business after the year 1925. The character of the business was being transformed so considerably that it was imperative, with a continuation of ownership, that the conditions should be changed in this particular direction.

This brings us to another advantage on the side of the Association. The fact that the contract has been extended to 1950 will at once produce benefit, inasmuch as the amortization which has hitherto been charged against the profits of the station in view of the prospect of an expiry of the contract in 1925 can now be extended to 1950—that is to say, it can be spread over 38 years, instead of 13 years.

In the unlikely event of the consumption not increasing, the profits of the station after 1925 would, under the new contract, be reduced; but the extension of the contract to 1950 is in itself a very valuable thing. Some of the local newspapers describe the issue of the negotiation as a magnificent Christmas present; and the only thing that the socialistic papers object to is the increase in the price of gas used for purposes other than lighting, from 12 pf. to 14 pf. But then it will be to the advantage of the consumers to use gas for all purposes, including lighting. At the present time, those who employ gas for the combined purposes at the two prices have to pay rent for two meters; and they have two sets of bills. When, therefore, the flat-rate for gas comes into force, those who consume gas for all purposes will not be paying more, on the average, than hitherto. This will be an inducement on the ground of economy, to make the gas supply the common means of lighting, cooking, and heating. Therefore the conditions of the new contract should be to the mutual advantage of the city and of the Association.

It is a most interesting story. The importance to the Imperial Continental Gas Association of the extension of the contract to 1950 is obvious, and a matter for congratulation. It was an opportunity that the Association could not afford to lose; and it had to be dealt with summarily.

Manchester and District Junior Gas Association.—The third of the series of lectures arranged by the Association, in conjunction with the Manchester District Institution of Gas Engineers will be delivered in the Manchester University on the 13th inst., by Professor E. Rutherford, F.R.S., who will take for his subject "Radio-Activity." The Lord Mayor of Manchester (Councillor S. W. Royse) will preside on the occasion. At the close of the lecture, members will take tea together in the College Union Refreshment Department, and will afterwards assemble in the Schunck Library to hear a paper by Mr. C. H. Foden, of Manchester, on "Gas-Works Accountancy." The first of the special course of evening lectures which have been arranged will be given in the Chemistry Theatre on Thursday, the 11th inst., by Dr. Harold G. Colman. There will be twelve lectures in the course.

PERSONAL.

Mr. DENNIS HARTLEY has accepted the position of Works Superintendent at the Buenos Ayres Gas-Works. He received his training at Hebden Bridge, as pupil and assistant for five years under Mr. E. J. Wellens, the Engineer and Manager to the Hebden Bridge and Mytholmroyd Gas Board, and for two years since has been with Drakes Limited, of Halifax, studying constructional engineering.

OBITUARY.

The death occurred on the eve of Christmas of Mr. SAMUEL BUCKLEY, an ex-Mayor of Oldham. His chief work in the Town Council was on the Water Committee; and many years ago he performed the opening ceremony in connection with the Corporation's water-works at Denshaw. Mr. Buckley was 74 years of age; and he died at Oldham after a brief illness.

The death occurred last Thursday, two days after celebrating the 74th anniversary of his birth, of Alderman STUART UTTLEY, the senior Labour member of the Sheffield Corporation. Deceased entered the Council in 1886, and served on the Highways and Technical Instruction Committees, of the former of which he was for a time Chairman. He represented the Corporation on the Technical Committee of the University College, and on the West Riding Rivers Board; and he was a Nominee-Director of the Sheffield Gas Company.

Mr. F. C. SHERMAN, who was for thirty-five years Superintendent for the New Haven (Conn.) Gas Company, died on the 18th ult., after an illness of two months. Deceased was born in Ware (Mass.) on March 21, 1833; and his early years were spent in the town. Practically all his life was devoted to the manufacture of gas. He was Superintendent of the Brookline (Mass.) Gas Company for eleven years, and afterwards held a like position with the Worcester (Mass.) Gas Company for five years. In 1875 he became Superintendent of the New Haven Gas Company, and held this position till he retired from active business in April, 1903. He was a member of the American Gas Institute, of the New England Association of Gas Engineers, and also of the Society of Gas Lighting of New York.

PROFESSOR BONE'S VISIT TO AMERICA.

English and American Audiences Compared.

IN another part of the "JOURNAL" will be found some extracts from the lecture on "Surface Combustion," delivered by Dr. W. A. Bone, F.R.S., Livesey Professor of Applied Chemistry in the University of Leeds, to the members of the American Gas Institute, at their annual meeting in St. Louis last October. It may be remembered that the correspondent who forwarded to us some notes on the meeting characterized the lecture as "the most interesting event" of the occasion. So greatly was it appreciated, that it had to be repeated on two successive evenings—at the Rumford Hall of the Chemists' Club, New York, and before the Franklin Institute, Philadelphia. Dr. Bone had to return to England to resume his professional duties; but he left his two assistants behind to give private demonstrations to interested parties. In response to a joint request from the United States Bureau of Mines and the University, they repeated the lecture and demonstration at Washington; and Dr. Bone's colleague (Mr. M'Court) is, we believe, still in the United States for the purpose of giving further information in regard to technical points. It will be noticed, from what appears elsewhere, that Dr. Bone was able to include in his lectures in America matter connected with the industrial applications of surface combustion which was not available when he appeared before the members of the Institution of Gas Engineers in Glasgow last June. The keen interest taken in the lecture by the gas engineers assembled at St. Louis, and the subsequent requests for information on the subject by some of the learned societies of the United States, seem to show that—to use words which have much significance on the other side of the Atlantic—surface combustion has there "caught on."

It was hardly to be supposed that a man of Dr. Bone's standing in Leeds, returning from an important scientific mission to the States, would be allowed to rest without a visit from some ubiquitous "interviewer." He consequently received a visit from a representative of the "Yorkshire Daily Observer," to whom he recounted some of his experiences. Contrasting the attitude of his audiences in this country and in America, he said that those who heard him at the Royal Institution were greatly impressed by the lectures, and especially by the experiments which accompanied them. But the matter did not appear to have attracted much attention from manufacturers. Much greater curiosity was displayed in America, when, in due time, the report of the lectures came into the hands of a few members of the American Gas Institute. They appeared to realize at once that this was a question about which they ought to know more; and, after they had conferred with other members, it was agreed that he should be invited to go out on his own terms and lecture to them on the new method of combustion. His first audience, consisting entirely of men concerned in technology and industry, were profoundly interested in the long experimental demonstration which followed the lecture; and within a day or two he began to receive requests from all parts of the United States to repeat both the lecture and the demonstration.

What struck Dr. Bone most forcibly was the consistent attention paid by his American audiences, and their willingness to listen and watch for hours, provided that something was being said or done which they found new or interesting. In nearly every case the lecture and demonstration lasted for 3½ hours; but his listeners were as attentive at the end as at the beginning. He thought them far keener on new ideas than Englishmen; and whereas an average English manufacturer wants to see a new idea in actual industrial practice before thinking about adopting it, he was repeatedly asked for permission to experiment with the new process. He speedily gathered that American directors of industry will risk more in the way of experiment than Englishmen; and this is why he believes new machinery and new processes are developed there much more quickly than here, and why, if a new machine is found to be better than the old, the latter is quickly scrapped.

With regard to the use of fuel, Dr. Bone was told that only recently have those concerned awakened to the fact that, enormous as are the natural supplies available, there is a need for care in their utilization. Consequently, much more attention is now being paid than formerly to questions of the calorific value of different kinds of coal. The Government have taken the lead in this matter, having established several experimental bureaus for the benefit of industry. They have also begun to buy coal according to its calorific value; and some of the larger manufacturers are doing likewise. Dr. Bone considers that this will, in time, become the prevailing system.

ASSOCIATION OF CONSULTING ENGINEERS.

The Draft Rules.

It may be remembered that rather more than twelve months ago reference was made in the "JOURNAL" to the formation of the above-named Association. A Committee was appointed to draw up rules, and a copy has been forwarded to us by the Hon. Secretary, Mr. A. H. Dykes, of 11, Victoria Street, S.W. These will be considered at the inaugural meeting, at the Institution of Electrical Engineers on the 15th inst. There will be only one class of member, and he must fulfil the following conditions.

(*a*) He shall be in practice as a consulting engineer, either individually or as a partner of a firm of consulting engineers.

(*b*) He shall be of such standing as, in the opinion of the Committee of the Association, entitles him to admission to the Association.

(*c*) He shall be a full member of the Institution representing the particular branch of the profession in which he practises.

(*d*) He shall not be a member of, or a partner in, or an agent for, any contracting or manufacturing firm or company or business with which he may have occasion to deal on behalf of his clients.

(*e*) He shall not be a director or employee of, or be an agent for, any company doing engineering insurance work.

(*f*) He shall not be connected with any company or business who advertise or canvass for consulting work.

The rules relating to the conduct of the members are as follows:

A member shall act in all professional matters strictly in a fiduciary capacity with regard to any clients whom he may advise, and his charges to such clients shall constitute his only remuneration in connection with such work.

He shall not accept any trade commissions, discounts, allowances, or any indirect profit in connection with any professional work on which he is engaged.

He shall not, without disclosing the fact in writing to his clients, be a director of, or shareholder in, or have a financial interest in, any contracting or manufacturing firm or company or business with which he may have occasion to deal on behalf of his clients.

He shall not receive, directly or indirectly, any royalty, gratuity, or commission on any patented or protected article or process used on work which he is carrying out for his clients, unless and until such royalty, gratuity, or commission has been authorized in writing by those clients.

He shall not act for a new client to the prejudice of an existing client.

He shall place orders explicitly on behalf of his client, and not on his own behalf.

Except at the request of the client, he shall not be the medium of payments to any contractor or business firm, but shall only issue certificates for payment by his client.

He shall not knowingly accept professional work in connection with which another member has been appointed, unless either formally notified by the client of the termination of the previous appointment, or else in collaboration with the other member.

He shall not advertise directly or indirectly for professional employment, nor shall he answer any advertisement for a consulting engineer.

He shall not solicit professional work, either directly or indirectly or by an agent; nor shall he pay, by commission or otherwise, any person who may introduce clients to him.

He shall not conduct himself in a manner, nor act in any capacity, nor hold any appointment, which, in the opinion of the Committee of the Association, prejudices his position as a consulting engineer.

The affairs of the Association are to be managed by a Committee of twelve, with an Honorary Secretary and an Honorary Treasurer, who are to be members of the Association.

TRAINING GAS SALESMEN.

"A MAN'S powers of thought, will, and action can be as scientifically and surely developed and strengthened as can his physical powers; and he needs to have his mental and moral qualities trained and exercised for 'the business-success race,' as thoroughly as he needs to have his body trained for a swimming race, a running race, or any other feat of athletics requiring bodily fitness." These words are among the main ideas upon which the course of instruction is based at the Sheldon School of business training. There is philosophy in the words; and the more they are pondered over, the more important in our minds must become the truth that they convey. Think upon it. If a man's powers of thought, will, and action can be scientifically developed, as they certainly can be, every man in the commercial world whose powers of thought, will, and action become so developed supplies an additional force in the world's affairs; and the more men there are whose powers are so expanded, the greater will be the additional force. When we look at this from the commercial point of view, the man who, by his own act, submits himself to this scientific cultivation, and applies his will and brains to achieving the development of his powers, must, on proving himself to be a better man than before, command a higher market value in the particular vocation he has adopted, because he is of greater worth to the business with which he is associated, by bringing to bear upon its development and protection the additional power he has acquired. If we reverse the question for examination, it is easy to appreciate how both men and business may suffer through failure to realize and develop latent power, and through the indolence and perfunctoriness that dominate so many in the present day.

No man knows what he can do until he has tried. No man exactly knows the compass of his talents until he has put them to the test. And no man knows how much his talents can be developed scientifically until he has been through a course of training, and exercised thought, will, and action in applying his freshly-acquired knowledge—knowledge that in itself is power—and mental strength. All this applies to the gas salesman, who requires proper scientific training—not only in regard to the technics of the industry but in regard also to commercial principles and methods involved—just as much in his particular sphere of the world's work as the gas engineer in his, or the carpenter in his. It is a development of later years that prescribes, and that rightly, the necessity for a clerk being properly and accurately trained in the principles of commercial work, instead of merely being found a stool in an office, and picking up what he can from his more or less indulgent seniors. If the clerk, why not (and with stronger reason) the gas salesman, particularly in these days, when there is a call upon his capabilities in several directions? We are led to these reflections by the two other main ideas set out in the Sheldon course of business instruction. One is: "Success in business depends upon a man's power to persuade customers to purchase goods at a profit, and so to serve those customers that, by ensuring their satisfaction and winning their confidence, he may secure their permanent patronage and their recommendation of his service to others." The other: "This power depends upon a man's knowledge of himself; knowledge of his goods and how to present them; knowledge of human nature; and the will, determination, and energy he exerts in putting that threefold knowledge into action."

When we appreciate the three main ideas that underlie the course of instruction, then we have the fundamentals in our possession of the scheme of training in salesmanship that Mr. A. F. Sheldon founded in Chicago in 1902. He is a University graduate and a barrister-at-law; but his line of subsequent work was as the business manager of a large firm. In this capacity he experienced difficulty in securing the type of salesman that he required; and he set to work to probe the secret of the failure of so many men in the art of knowing what to sell, and how to sell, and how to maintain business. There is science in salesmanship; and he put this science into practical shape—preparing test-books, courses of instruction, and lectures. In the United States and Canada, no less than 53,000 students have taken the Sheldon course—many of them solely through correspondence, study, and examination. A branch has been established in England; and information can be obtained at No. 329, High Holborn, W.C.

The Governor of the Gaslight and Coke Company (Mr. Corbet Woodall) and the General Manager (Mr. D. Milne Watson) had their interest aroused in the work of developing the faculty for creating business by the scheme being introduced to them by the Company's Controller of Gas Sales (Mr. F. W. Goodenough); and, as a consequence, not long since, the scheme was floated in connection with the Company. So enthusiastically was it taken up, that already 150 officers and men in the Sales Department have been enrolled as students, and four clubs formed for instruction and discussion. This shows a desire to make themselves more proficient in their work. The Company have given them facilities, by advancing the necessary fees—the students paying two-thirds of the fees by instalments. But the first reward of success is that the Company repay one-half the subscriptions if the student is successful in graduating at the end of the course. Every effort to improve the workers in the gas industry, in whatever sphere, has our full sympathy, and all the encouragement that can be afforded through these columns. This Sheldon scheme is a decidedly interesting one.

A TREATISE ON GAS CALORIMETRY.*

THERE is ample scope for a reliable and compact text-book on gas calorimetry by an author having the necessary knowledge of physics, and a good practical acquaintance with the more important forms of gas-calorimeter in use at the present day. The physical questions involved in the discussion of the underlying principles of calorimetry and of the design of calorimeters are full of pitfalls for the tyro; and soundness of judgment and freedom from bias are of paramount importance in a critic of calorimeter construction. An author of the requisite calibre will not therefore readily be found.

Mr. Coste, in the work now before us, has attempted the difficult task of writing a treatise on calorific standards and calorimetry as applied to gas; and while we cannot regard his effort as entirely successful, it is welcome. The treatise is somewhat more pretentious than its size—about 300 pages—would imply. Nearly a quarter of the volume, however, is filled with matter the inclusion of which in a simple text-book on the calorific power of gas could be excused only if the author were an authority on the principles and methods of carbonization of coal. Whether Mr. Coste can claim to occupy this position may be judged from the fact that he essays to instruct in gas calorimetry by presenting his readers with illustrations of five forms of Murdoch's primeval, though historic, iron retorts, and one illustration only of later carbonizing plant—a modern setting of verticals.

The century which intervenes between Murdoch and Glover-West is covered in the text by scraps of information, such as "a good yield for horizontal retorts would be 10,000 to 11,000" (cubic feet of gas per ton of English coal), and that the use of inclined retorts is growing in modern gas-works. We trust that these statements do not fairly represent the state of knowledge of gas manufacture which prevails in the so-called "Gas Department" of the London County Council, of the technical staff of which we believe Mr. Coste is a member. The bulk of the coal carbonized in horizontal retorts in and around the London County Council's district, certainly yields much more than 11,000 cubic feet of gas per ton; and there has been no growth in recent years in the number of inclined retorts installed within that area. A sketch of the principles and methods of carbonization such as is given by Mr. Coste appears to us to be out of place in a treatise on the calorific power of gas; but though another opinion may fairly be held on this point, the technical information vouchsafed, even if irrelevant, ought to be correct and up to date.

The first chapter of the book, in addition to the sketch of changes in the methods of use and manufacture of gas already referred to, contains a summary of gas legislation leading up to the inclusion in the Gaslight and Coke Company's Act, 1909, of a standard of calorific power for the gas supplied by the Company. The author expresses regret that compulsory calorific testings for information were not included in the provisions of the Standard Burner Acts of 1910. The information thus gained would, he thinks, have been a most useful guide to all parties concerned. We differ from him on this point, since we believe that gas companies will gain without compulsion all the information they require for their guidance, and that other parties may gain all the information which they can reasonably want without being compelled by Statute to employ an examiner at their own or the gas company's expense. The desire of the gas examining fraternity to multiply their duties and magnify their office, with which Mr. Coste appears in this statement to associate himself, must not be gratified merely on the plea that the information to be gained should prove a most useful guide to all parties. The gas consumers have ultimately to pay the piper if they allow the operations of a gas undertaking to be hampered through the attentions of gas examiners seeking "information," the value of which to anyone will be extremely problematical.

The second chapter opens with a discussion of the relationship between illuminating power and calorific power, the upshot of which is that, with the results of myriads of daily testings for "information" at his disposal, the author has been unable to assure himself that any general relationship subsists between these two qualities of a gas. A few tabular statements are given to illustrate the fluctuations in calorific power of gas of the same illuminating power; but if they fairly crystallize the conclusions which may be drawn from the results of the daily testings carried out by the London County Council, it is impossible to see how such a small return can justify the large annual expenditure of public funds which is entailed by the elaborate system of daily testings in vogue in London. The fallacious nature of deductions as to the relation of calorific power to illuminating power, which may be drawn even by distinguished scientific men from results of testings such as those conducted by the London County Council has been well demonstrated in an article in the "JOURNAL" for July 26, 1910 (p. 254). The tabular statement and diagram given in that article, based on the whole of the London County Council returns to date, seem to us to afford quite as valuable and conclusive information as the tables relating to smaller numbers of testings given by Mr. Coste.

The question as to whether the calorific value of gas should

* "The Calorific Power of Gas. A Treatise on Calorific Standards and Calorimetry." By J. H. Coste, F.I.C., F.C.S., Member of the Council of the Society of Chemical Industry, and Past Member of the Council of the Institute of Chemistry. London: Charles Griffin and Co., Ltd.; 1911.

ordinarily be expressed in terms of its "gross" or "net" calorific power is discussed at the close of the same chapter; and Mr. Coste's official bias naturally leads him to favour the "net" figure. But he quotes fairly from Professor C. V. Boys and our editorial columns arguments in support of the "gross" value being adopted in any future Statute in which a standard of calorific power is imposed. Also, but not in the same connection (where it would have been most apposite), he quotes the following explanatory words given by the Gas Referees in their Notification:—

When the products of combustion are cooled before they escape, the heat imparted includes that which is due to the condensation into water of some of the steam formed by combustion, and that which is due to the cooling of the water thus formed from its boiling point to a lower temperature.

The maximum calorific power which gas can thus exert is determined directly by the calorimeter. This is a true measure of the total heating power, and is termed the gross calorific power of the gas. But in many cases in which gas is used as a heating agent the steam which is formed escapes into the air uncondensed, and thus the heat due to the condensation of the steam and the cooling of the water so formed is not utilized. The amount of heat thus lost can be estimated; and if it is subtracted from the total heat yielded by the combustion of gas in the calorimeter another value is obtained, which is termed the net calorific power of the gas. Since, however, when steam escapes uncondensed the uncondensable products of combustion also pass away at a high temperature, and since the loss of heat thus arising is commonly the greater of the two, the customary partial correction from gross to net has not much significance.

We need only add that gas companies in future should see that their gas is valued in terms of "gross calorific power," which is "a true measure of the total heating power," and can be determined directly by a good calorimeter with an accuracy exceeding that of the measurement of gas by the experimental meter.

In his remarks on existing calorific standards, Mr. Coste makes a serious blunder, calling for immediate correction. He gives the calorific standard recently adopted for Paris gas quite correctly at 4700 calories net per cubic metre; but he then says that it is approximately 133 calories net per cubic foot. He goes on to observe that the pure coal gas supplied in London is seldom of as high average calorific power as 133 calories net per cubic foot. But the Paris cubic metre is of gas at 0°, 760 mm., and dry, whereas the English cubic foot is of gas at 60° Fahr., 30 inches, and saturated. Hence the Paris standard is really equivalent, as was stated in the "JOURNAL" for Dec. 19 last, to 492 B.Th.U., or approximately 123 calories net per cubic foot. Since Mr. Coste is obviously quoting the Paris standard mainly for the guidance of local authorities who may be considering the adequacy of the calorific value of the gas supplied in their districts, it is clearly proper that they should be warned that he has put the Paris standard ten calories higher than it actually is, and has wrongly inferred that the quality of the gas supplied to Paris is much higher than that of the gas supplied to London. A blunder of this magnitude is inexcusable on the part of an author whose advice on calorific standards might reasonably be regarded by municipal authorities as possessing considerable weight.

The third chapter of the book deals with the constituents of coal gas and similar gaseous mixtures. In this connection, the value which should be properly assigned to the mean calorific power of the mixed heavy hydrocarbons (C_nH_m) of coal gas for the purpose of calculating the calorific power of a sample of that gas from the results of its analysis is discussed at great length. Mr. Coste, in the paper on "Technical Gas Calorimetry," which he read before the Society of Chemical Industry in 1909 [see "JOURNAL," Vol. CVIII., p. 816], argued that these mixed hydrocarbons could properly be assessed in the mean at the same calorific power as propylene, which he gave as about 590 calories per cubic foot at 60° Fahr. and 30 inches. He has now altered his method of calculating calorific power from the analytical results, and quite properly regards the gas and its constituents as saturated with moisture at 60° Fahr.—a point which, as Dr. Colman mentioned in the discussion on his paper, he appeared to have overlooked. As a consequence, he finds that the mean calorific power of the heavy hydrocarbons in coal gas is considerably higher than that of propylene, and he concludes finally that it may be taken at 670 calories gross per cubic foot. He thus reverts to a figure given long since by Mr. Butterfield in his textbook on "Gas Manufacture," in the statement: "Thus, for ordinary 16-candle coal gas the calorific value of one cubic foot of the mixed hydrocarbons (the C_nH_m of analysts) in the gas may be taken at about 670 calories." Nevertheless, it should be pointed out that Drs. Pfeiffer and Colman, in the section on "Illuminating Gas and Ammonia" in "Technical Methods of Chemical Analysis," state that it is customary to assume that the mixture of heavy hydrocarbons has the same calorific power as propylene, though they add that this can only be regarded as an approximation, and that the agreement of figures for the calorific power of coal gas so calculated with those obtained by the calorimeter, is only within 2 or 3 per cent. According to Mr. Coste, the value of 670 calories per cubic foot, as originally given by Mr. Butterfield, affords figures in closer agreement.

The latter part of the third chapter is filled with matter, culled from various authorities, relating to the composition of the gas obtained in different manufacturing conditions; and we have already said that such matter appears rather out of place in a work of this character. Quotations at great length are made from the work of Drs. Constam and Kolbe, as given in our columns in 1908, and the report of Professor Bunte on the work done at the Experimental Works of the German Gas Association in 1909. The matter taken from these and other good authorities is, of course, quite sound; but the manner in which it has been assembled and correlated leaves much to be desired.

The fourth chapter is the most useful in the book, since it contains descriptions of the various types of gas-calorimeters. Many, however, which are obsolete, or are merely flattering imitations of others, and involve the application of no new principle, are described, to the detriment of the clarity of exposition and utility of the chapter as a whole. The descriptions of the more important types are taken directly from the maker's or official papers. The comments of the author are, generally speaking, sound; but somehow points which tend to depreciate the value assigned to a sample of gas generally meet with his approval. For instance, he prefers to supply a calorimeter with water at the temperature of the air of the room, and describes suitable forms of tank for erection in the calorimeter room and means of warming in order to secure the temperature. But it has already been pointed out in these columns that greater accuracy is obtained if the products of combustion are discharged from the instrument at about the temperature of the room; and this temperature of discharge is secured in most types of calorimeter when the water supply is 4° to 6° C. below that temperature.

We are glad to note in this connection that M. Lauriol, in the directions which he has issued for testing the calorific power of Paris gas, incidentally upholds our view. [*Vide* "JOURNAL," Vol. CXVI., p. 816.] He takes the water supply from a tank in the room; but before each test he admits cold water to the tank until its contents are about 4° C. lower than the temperature of the room. There can be no doubt that if water has to be used for calorimetry from a tank in the room, instead of direct from the house supply pipe (as suggested by the Gas Referees), its temperature should be reduced before each test below that of the room in the way described by M. Lauriol. Otherwise the results of the test will in most cases be appreciably unfair to the gas.

Mr. Coste's book concludes with an appendix giving the tabular numbers from the Gas Referees' "Notification," and a few other tables. Speaking broadly, Mr. Coste's work should prove very useful to those requiring a full descriptive account of the different types of gas-calorimeters; but his comments and criticisms should be received with caution by those whose knowledge of physics does not enable them to form an independent judgment. Moreover, his suggestions in respect of suitable standards of calorific power for public gas supplies and cognate questions appear to us almost always to be in directions inimical to the best interest of a gas undertaking, and therefore in modern competitive and legislative conditions to those of the gas consumers.

A very large proportion of the matter in the book consists of quotations from the "Notification" of the Gas Referees, and from papers which have appeared in the "JOURNAL" and a few other technical publications. In many cases the quotations are of inordinate length, and their contents might, with great benefit to the terseness and continuity of the text, have been abstracted or paraphrazed by the author. There are numerous misprints, especially in German names and titles. The spelling of words, such as "metre" in cubic metre, varies from time to time between "metre" and "meter," while Professor Threlfall's name is constantly spelt as "Threlfull." Some of the misprints, such as "Dried formation of methane," are distinctly puzzling, as "direct" does not at once suggest itself in place of "dried." But these are minor points, which can be amended in a subsequent edition of the book, and do not appreciably affect its value as a whole.

Copper Sulphate as a Destructor of Micro-Organisms.—The use of copper sulphate to destroy micro-organic growths in the water supply of Newark (N.J.) was commented upon by Mr. Morris R. Sherrerd in an address at the recent annual meeting of the New Jersey Sanitary Association. He said Newark had been troubled most by the presence of synura, and it had been found advisable to use one part of copper sulphate to 6 million parts of water. The chemical was dissolved in water, and the solution applied to the streams.

The Methane Equilibrium.—This was the subject of a recent communication to the Chemical Society by Messrs. J. N. Pring and D. M. Fairlie. Carbon was heated electrically in hydrogen at definite known temperatures between 1100° C. and 2000° C., and under pressures between 10 and 200 atmospheres. The velocity of the formation of methane was found to increase rapidly with the pressure, and to proceed to a final equilibrium stage. As would follow from the law of mass-action for a true equilibrium, the value of $p\text{-}CH_4/p\text{-}(H_2)^2$ was always found to be constant under different pressures if the temperature were the same, and the same modification of carbon was used. With amorphous carbon, temporary equilibrium values were obtained, in which at all temperatures the amount of methane was greater than that corresponding with the true equilibrium with graphite. The relative difference between the equilibrium values for amorphous carbon and graphite increases with the temperature. It follows from this, by applying Kirchhoff's law, that the mean specific heat of amorphous carbon is, at all the temperatures concerned in this work, higher than that of graphite, and that the difference increases with the temperature. No appreciable effect was exerted by high pressures on the yield of acetylene and ethylene; and no other hydrocarbon was formed.

ELECTRICITY PUBLICITY MOVEMENTS.

THE Electricity Supply Publicity Committee are extending their field of operations. They have begun the publication of a paper to be known as "The Journal of the Electric Supply Publicity Committee." It is, in the first place, to be issued as a quarterly. If success attends the venture, the periodicity is to be reduced to once a month. The matter that is to appear in the paper is to be written by commercial managers for commercial managers, with the one object of furthering the aims of the Committee, "which is [*sic*] the popularization of electricity in all its uses, to the benefit of the electricity supply undertakings." There is an accidental omission on the part of the editorial note writer in not mentioning the defamation of gas as one of the "aims." In short, the little magazine is to be confined wholly to the commercial side of the industry. There are some of the established electrical papers that do not look with approbation upon this newcomer. They cannot see the use of it; being modestly of opinion that they do all that is necessary in catering for the commercial side of the industry. Every subscriber or customer of the Publicity Committee will receive one free copy of each issue, and other copies can be obtained by them at the price of 3d. each. There are other "objects" stated as though they are perfectly subsidiary, but they are obviously primary.

In the editorial notes, the Committee blow their own trumpet. In certain of the weekly electrical papers there has been criticism of the Committee's work and productions. "In its pamphleteering work," it is written in the editorial notes, "the Publicity Committee has achieved magnificent results in a remarkably short space of time; and the matter dealt with has been in volume beyond all anticipation." One of the electrical papers describes some of the pamphleteering work as having the trail of the amateur over it; and several of the samples that we have seen have borne that characteristic. Perhaps the "magnificent" results have been through the sales of the pamphlets to electrical managers who are either incapable of judging of their quality, or purchase out of charity. The (in electrical literature) ubiquitous Mr. A. H. Seabrook, the General Manager of the Marylebone Electric Supply Undertaking, in an article in the new venture headed "Powder and Shot," claims knowledge of what is done with some of this literature by "many electric supply managers." "They buy a little literature spasmodically, and issue some (some will be permanently forgotten in an obscure corner of the stationery store) at probably quite unsuitable periods of the year, and to quite unsuitable people." Probably this partly accounts for Mr. H. B. Renwick, the Chairman of the Electricity Committee, in an article that he contributes, being able to boast that, in the short space of less than two years, . . . nearly a hundred publications have been made;" and, as to sales, "the individual totals of certain particular circulars reach to nearly 150,000." Clearly the articles published in the paper will require editing a little more circumspectly to prevent one writer rubbing some of the sheen off the boasts of another. The result that has crowned the pamphleteering work, it is editorially hoped, "will crown the projected extension of effort;" and naturally "we look forward to the day when every electric supply undertaking in the country will contribute its quota to the [publicity] fund, and receive its due reward in the shape of increased prosperity."

That is the point—additional contributions to the Electricity Publicity Fund. At present, there are 105 home municipal electricity undertakings supporting the Committee, 54 home company undertakings (some of them carrying on operations in more than one centre), and 11 colonial undertakings—making altogether 170 concerns. It will be seen from these figures that the greater number of supporters are municipal undertakings, while in the new British Commercial Gas Association the number of municipal concerns is comparatively small, though those who are subscribers stand high in municipal status. Pausing for a moment, the case for further support being given to the Electricity Publicity Committee does not appear to be very strong, inasmuch as Mr. Seabrook, in his article, remarks: "Surely, if gas can be sold by continual hammering at the public, and the never-leaving-of-a-stone-unturned idea, electricity can be sold at one-tenth the exertion." If this be true, there is no need for any more than the spending of one-tenth the money on electricity publicity that will be expended on gas publicity.

The articles in this first number of the new journal are edifying to those who have occasion to watch the movements of the opposing camp. In the article by Mr. Renwick, he thinks he advances cogent argument in favour of the extension of the policy of co-operative commercial effort in every possible direction. In other words, what he wants to see is that the Electricity Publicity Committee shall be financed to such a degree that the modes of warfare that the Committee have hitherto adopted and followed shall be carried further. It is well for the gas industry to note this. Practically, he takes credit to the work that the Committee have been doing for having brought into being the British Commercial Gas Association; and he claims that the very existence of the Association is a compliment to the work of his own Committee. We are not at all so sure of this. The appliances and business of the gas industry have made such strides that the spread of the knowledge of the former and the protection of the latter are alone sufficient reasons for the new Commercial Gas Association. In addition—and in addition only—the character of the operations of the Electricity Publicity Committee, in attempting to render aid to the electricity supply industry by slandering its popular rival, supplies a reason for existence, in order to take the necessary counteractive measures. When managers of the electricity supply industry consider this, there may be those among them who will question the wisdom of further financing the Electricity Supply Committee while they persist in this particular procedure. From it, there can be no question that, at some time, an electrical undertaking, through the use of certain of the literature, will find the Committee have been ignorantly spreading a net, partly at the expense of the undertaking, that will enmesh it in an uncomfortable manner.

Mr. Renwick has much to say about the lines of the work of the Committee—past and hoped for. They are apparently looking to the strengthening of their resources in the matter of ideas by mutual co-operation with similar organizations that are being formed in America and Germany. They are also looking, as previously remarked, to a large expansion of financial support, for larger scale newspaper advertising. But there is one branch of the Committee's work over which Mr. Renwick waxes quite eloquent. We ask his pardon (if it is needed) for quoting it freely:

> Another branch of the Committee's work has been in connection with the Daily Press. The Committee has kept a watchful eye on the Press with a view to counteracting any statements made therein, which appeared to be in any way inimical or prejudicial to the interests of supply authorities. . . .
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> This Press work differs from our publicity work on account of what I may call its silent character—that is to say, it goes on from day to day unknown to the general body of you, with a letter here, and a paragraph there, with a telephone message to this editor, and a wire to that editor, from all of whom we have at all times met with the greatest courtesy and fairness. In this way we have tackled all the various *unfounded* rumours regarding fires which have taken place during the time of the Committee's operations. These have been quite a large number, and have covered a wide area both at home and abroad.
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> This work, although it may not appeal to you in the same way as does publicity work, is none the less important; and it must be satisfactory for you to know that there is a central body here in London keeping a constant and careful watch over your interests in this respect, ready to act at a moment's notice. Our opponents had too long had it all their own way in the Press; and it was full time we had something to say in the newspapers in defence of our own interests on this and other subjects. The work of the Committee in this particular field of activity has certainly borne good fruit, and has proved to your Committee how impartial are the Press in such matters, and how ready they are at all times to treat each party with equal fairness, as long as they know the facts.

We admire the word "unfounded" as italicized by us; and perhaps (although we do not desire Mr. Renwick to think of us as hypercritical on this the first appearance of his journal), in regard to a little matter of construction, it may be suggested that, if he treats the word "Press" as plural, he might do so in the case of his "Committee." He shows there is a great deal of educational work to be done on behalf of electricity; and manifestly, it may be added, a little missionary enterprise among the members of the Committee would not be a bad thing. In regard to the public, Mr. Renwick says that they have to be persuaded that electricity supply undertakings are "retailers of coal in the form of electricity." If the public are shown the difference between the thermal value of the coal used in generating electricity and of the electricity that reaches the consumer, the public may find it difficult to realize any identity between electricity supply and the retailing of coal. In the work of breaking-down all the prejudices associated with electricity, Mr. Renwick is optimistic, and feels assured of the final success of the Committee.

There is a foolish comment on the constitution of the British Commercial Gas Association in another article. It reads:

> Turning to the constitution of this Association, we find the Committee has power to buy, hold, or sell, on behalf of the general body, various kinds of stocks and shares, land, and house property, to promote conferences and exhibitions, and to assist in newspaper advertising, and the publishing of literature. The rubber market will doubtless be glad to hear of anybody disposed to favour "gassy" prospectuses; and we have no doubt that land and house property will be obtainable without difficulty. The question for us is, How much will be left for the real purpose for which the Association has been formed?

The explanation of this silly comment is probably to be found in subsequent words: "The trumpet blast has been sounded with sufficient force to reach our ears (*fortunately, they are long enough for that*); and we shall be ready when the time comes to repel the threatened attack."

In his article entitled "Powder and Shot," Mr. Seabrook is at once Solomonic and bloodthirsty, and in other respects is quite himself. Where he is himself, he speaks of "Old Harry;" and, dealing with the ignorance of the man-in-the-street on the subject of electricity, he writes: "The only way to get him to know it is to continually, untiringly, persistently, unremittingly, ceaselessly, wait-on-the-door-mat-ly, throw-out-of-the-window-ly, and by any other lawful means not hitherto mentioned, but intended, insist that he shall know it." What it all means, we do not know; but it is only fair to Mr. Seabrook to say the article was published before Christmas. Our friend is Solomonic when he talks pointedly to those who purchase ammunition from the Electricity Supply Committee for rook-scaring, or for assisting to fill up their stock-rooms. In his more bloodthirsty moments, he shouts out: "The killing part of the business is the killing of the *ridiculous* statements made by our competitors as to the hygienic, &c., advan-

tages of gas for lighting and heating." It is quite sufficient for Mr. Seabrook to use an adjective that suits his current mood, never caring whether or not it is justified. Some notion as to how the killing is to be performed is found in another article headed "Make Him Think." It advocates an appeal to health as being the most poignant method of stirring a man up to think over the matter of the pollution of the air "with noxious and harmful chemical products of combustion." This is an actual quotation from the circular intended for use by those people who are not at all particular over questions of commercial moralty.

> The danger of these products of combustion lies in the difficulty in detecting their presence by the sense of smell; and by the time they have been found out, they have *probably* effected their *deadly* work.

This is outraging truth with a vengeance. Some other statements are made, among them being a reference to "poisonous oxides of carbon, and other dangerous chemical products of combustion." Remember this is a form of circular recommended for placing in the hands of the householder, who is told that he "can examine the correctness of the statements by reference to the reports of eminent official authorities, extracts from which will be forwarded on application to this office. An illuminating or heating agent that is not good enough for a factory is surely not good enough for you and your household." It is playing the game very low indeed, when the Publicity Committee cannot rise higher than factory reports (in which the conditions of use are not explained), and apply them to the conditions of domestic use. We ask who are the "eminent official authorities" here referred to? Are they the ordinary factory inspectors? Are these "official authorities" men of the same eminence in the medical and scientific world as those whose opinions and researches can be quoted, in proof of the fact that, used as gas should be used, the imputed dangers are baseless. We assume that Mr. Renwick, the Chairman of the Committee, would feel very hurt if his honour was assailed. We ask him to reply to the straight question whether he, as a man of honour, thinks the suggested use of extracts from factory reports is honest, and whether it is in accord with a high standard of tactics in a commercial campaign? We shall be interested in his reply, and indebted to him if he will favour us with copies of the extracts in question.

There is another article by Mr. A. F. Harrison, the Secretary of the City of London Electric Lighting Company, Limited, from which it appears that the Committee have obtained the services of Mr. R. Borlaise Matthews to undertake the writing of a pamphlet on electric cooking, in which are promised "some striking figures" as to the "comparative losses in weight of food cooked by gas, coal, and electricity respectively." We hope Mr. Matthews will do the manly thing—that is, state the names of the makers of the stoves used in the tests, the nominal distinctions of the stoves (with sizes), the district or districts in which the tests were made, the prices of gas and electricity for cooking purposes, who made the tests, and any other information necessary for the tests to be repeated.

We have been interested in reading the new journal, and hope future issues will prove as interesting—and entertaining.

THE IRON AND STEEL TRADES IN 1911.

THAT the actual results of the past year's business in the iron, steel, and kindred trades are not by any means satisfactory from the point of view of the exporter, is the remark with which Messrs. Bolling and Lowe on the present occasion commence their annual review. For such signs of a gratifying condition of affairs as have been witnessed, the consumption for shipbuilding purposes and other requirements at home is held to be mainly responsible. The outlook in the spring, it is pointed out, was decidedly gloomy, and reports were not encouraging. Large quantities of Belgian and other Continental material were offered to the Midlands at rates that found ready buyers; and a reduction in the price of Cleveland pig iron, &c., was a further indication of weakness, which was accentuated by imports of American steel that were regarded as the forerunner of lower prices. An additional cause of weakness was the break-up of the Scotch combine, with a consequent reduction in the price of bars. Late in the autumn, considerable advances took place in the price of Belgian iron and steel, which were welcomed as promising an increase in trade in our country's goods. A scheme of "deferred rebates" has been brought forward as a probable means of preserving a large amount of the home trade from the encroachments of foreign sellers; and with prices that are fairly equal, it is thought that this will no doubt effect its object.

There has been a considerable increase in imports of plates, tramrails, blooms, billets, sheet bars, &c., in many cases at a higher cost than in 1910; and, at the same time, the export figures show a substantial falling off, although here, again, values are higher. So far as the exports are concerned, galvanized sheets and tin plates are the two redeeming features in the trade—both showing an increase in quantity and value. With regard to railway material, however, there is a decrease of about 20 per cent. in quantity, and of nearly the same amount in value. Much harm to business is laid at the door of the misguided strike on the railways, as transport to the coast was, of course, for the time being paralyzed, and it was impossible to guarantee regular deliveries. "The interference with shipping," say the firm, "soon became universally known to buyers, who sought other markets where deliveries were more reliable. Even now the effect has not entirely disappeared; and there are constant instances of confusion and accumulation of goods at the various depôts and stations." And this is only one of many branches of industry that were disorganized by the too successful efforts of the agitators.

With reference to pig iron production, a heavy reduction in the quantity of ore imported from Spain, as compared with 1910, is pointed to as a significant factor. Prices were fairly level during the first nine months of the year; but in the last few weeks a sharp advance has taken place. It is looked upon as probable that ultimately a higher range of values will be established and maintained. Rails have constituted one of the worst sections of the trade, though at the moment there seems to be more inquiry for them; and with the home and continental mills full of orders for early delivery, improved prices in the near future are anticipated. In connection with this branch, Messrs. Bolling and Lowe remark that the International Rail Association have to distribute their favours over a certain area; and it is quite clear that, with only a limited demand, each country enrolled under the Syndicate must suffer according to its allotment originally agreed upon. However much railway extension may increase, it must be borne in mind that the number of rail-producing mills in various parts of the world is also growing; and this lessens the chances for the older countries and syndicated works. The markets for galvanized sheets and tin plates have a good appearance; but in regard to both these, the reviewers say that "the fact cannot be ignored that the healthy condition of the trade is partly due to the facilities available for purchasing cheap semi-products from abroad—a fact which deserves more than passing attention."

Discussion is not confined by the firm to iron and steel; other metals being also mentioned. The first of these is copper, the market for which, until the closing weeks of the year, wore generally a somewhat dull and listless appearance, with speculation upon a restricted basis, and price fluctuations confined to £4 or £5. Towards the end of November, however, there was a sudden sharp revival, arising from a recognition of the substantial strength underlying the situation. This led to an enormous broadening of speculative interest; and, with heavy stock reductions in the United States, the market swung sharply upwards, and prices, which about the middle of May stood at £53 10s. for cash delivery, touched £62 6s. 3d. on Dec. 18. The tin market, we learn, has been under highly speculative control all through the year; and there has been a range as between the highest and lowest prices of about £63. The situation of the article itself is stated to be a remarkably strong one; but temporarily the outlook is somewhat complicated as regards the speculative market by the hostility shown by the controlling parties to the standard tin contract, which has been introduced and put into force with the object of rendering it more difficult in future to bring about "bear squeezes."

Turning to other countries, the opinion is expressed that, in the matter of pig iron production, the year in the United States has been an unsatisfactory one; and it is estimated that the total output for the twelve months will not exceed 22 million tons, against over 27 million tons in 1910. In several directions there have been reductions in prices within the last few months; and no reason is perceived to anticipate any very great improvement in American trade for some time to come. German trade was also in the spring subject to considerable uncertainty; but subsequently things improved. "It has," say Messrs. Bolling and Lowe, "undoubtedly been a successful year for Germany; and we estimate the production of pig iron and the exports of steel to far exceed those of 1910—in fact, as far as steel is concerned, we expect the result to show a substantial advance even over Great Britain. There are great complaints of bad traffic arrangements; and the railway authorities seem unable to cope with the large quantities of material to be carried." As to Canada, the conviction is set down that we are only witnessing at present the dawn of great commercial development in the Dominion. In China, Japan, New South Wales, and on the Pacific Coast of North America, there is, it is pointed out, springing up a determination to reduce the dependency upon Europe and other sources of supply, which have hitherto looked to those markets for considerable custom. The increase of population in these quarters, and in others that may follow suit, will not, it is imagined, keep pace with their productive capacity; and the result will be an addition to the ranks of exporting countries, thus further adding to the fight for existence.

There are as usual included in the review figures as to our exports of iron and steel, and their value, for the eleven months ending Nov. 30 of each of the past three years. The figures for pig iron are given as follows: Year 1909—1,052,776 tons, value £3,373,402; 1910—1,119,478 tons, value £3,823,726; 1911—1,070,436 tons, value £3,435,829. The total exports of iron and steel were: Year 1909—3,996,622 tons, value £35,226,505; 1910—4,354,434 tons, value £39,829,712; 1911—4,241,911 tons, value £40,445,742.

The concluding words of the review are of better omen for the future, so far as the trades in this country referred to are concerned: "Although some of the foregoing may seem rather pessimistic, we are glad to be able to close with a more hopeful feeling as to the future. The political horizon is clearer; and we find that there is a feeling of confidence and cheerfulness as to the trade outlook for the coming year. Certainly the close of the present one has been marked by a general advance in prices which augurs well for 1912."

LOCAL INCOME AND EXPENDITURE.

The Accounts of Borough Councils.

THERE has lately been issued as a Blue-Book Part V. of the Annual Local Taxation Returns, which on this occasion embraces both the accounts of the councils of boroughs (other than metropolitan boroughs) and those of the urban district councils (other than town councils). The period covered is the twelve months ending March 31, 1910; and some figures are now given from the accounts of the borough councils—leaving those of the urban district councils for subsequent consideration.

The number of boroughs in existence at the end of the year 1909-10, excluding the City of London and the Metropolitan Boroughs constituted under the provisions of the London Government Act of 1899, was 327; and of this total 74 were county boroughs. The receipts (including transfers from one account to another), other than from loans, of the borough councils for the period here under review—not being the exchequer contribution accounts of county boroughs, nor the accounts relating to tramway, light railway, or water, gas, or electricity supply undertakings—amounted, in the aggregate, to £34,582,153. Of this sum, £19,999,679 was from rates; £27,785, the grant under the Agricultural Rates Act, 1896; £1,024,782, sums transferred in relief of rates from accounts relating to tramways and light railways and water, gas, and electricity undertakings; and £5,860,848 on account of education. The expenditure (exclusive of that defrayed out of loans, and of exchequer contribution accounts and accounts relating to tramway, light railway, water, gas, or electricity undertakings), including money passing from one account to another of the same corporation, amounted to £34,580,845, including £10,935,703 spent on account of education. Some of the principal items on this side (including loan charges) were: Public roads and streets, £5,166,072; sewerage and sewage disposal, £2,345,150; public lighting, £1,217,683; police (not including payments made out of police pension funds), £1,858,502; salaries, &c., and certain establishment charges, £1,465,355. There were also amounts transferred to make up deficiencies in revenue of tramways and light railways, water-works, gas-works, and electricity works, totalling £338,302.

The expenditure which was charged during the year by the councils, or was intended ultimately to be charged, to loan accounts, excluding the expenditure in respect of tramway, light railway, and water, gas, and electricity supply undertakings, was £4,320,425. The individual headings are: Education; public offices and buildings; lunatic asylums; bridges and ferries; public libraries, museums, &c.; burial grounds, harbours, piers, &c.; public roads and streets; sewerage and sewage disposal works; markets; housing of the working classes; parks and open spaces; other purposes. The total amount of loans that were actually raised during the year, excluding tramway, light railway, and water, gas, and electricity undertakings, and money borrowed under the Education (Provision of Working Balances) Act, 1903, was £4,126,162. The amount outstanding at the close of the year 1909-10 in respect of loans owing by councils (excluding tramway, &c., undertakings, but including education) was £126,729,239. Of this, £27,693,698 was for public roads and streets, £20,934,758 for sewerage and sewage disposal works, and £20,063,236 for education. The sums standing to the credit of sinking funds, loan funds, and redemption funds in connection with such of the outstanding loans of the councils as were repayable by means of such funds, amounted at the close of the year to £8,802,258 in the case of county boroughs, and £1,507,321 for the non-county boroughs concerned.

Turning now to the tables with regard to the accounts of councils connected with the undertakings that were not included in the figures already quoted—namely, tramway, light railway, and water, gas, and electricity concerns—it is seen that the receipts for the year 1909-10 (excluding sums withdrawn from reserve, &c., funds, and sums transferred from other accounts to make up deficiencies in revenue), other than from loans, and the expenditure not defrayed out of loans in the different classes, were as follows: Tramways and light railways—Receipts, including £44,877 received from other accounts of the councils, £6,241,308; expenditure, including loan charges, £5,646,394. Water undertakings—Receipts, including £187,195 received from other accounts of the councils, £4,367,523; and expenditure, including loan charges, £4,396,901. Gas undertakings—Receipts, including £495,386 received from other accounts of the councils, £6,935,406; and expenditure, including loan charges, £6,306,399. Electricity undertakings—Receipts, including £1,132,912 received from other accounts of the councils, £3,795,420; and expenditure, including loan charges, £3,603,838. This gives a total income for the four classes of undertakings of £21,339,657; and an expenditure of £19,953,532. It may be pointed out that the expenditure excludes sums paid to reserve, &c., funds, and amounts transferred in relief of rates, or to meet deficiencies in revenue of other undertakings; but expenditure out of sums withdrawn from reserve, &c., is included in the figures given.

The total amounts expended by the councils out of loans (or intended ultimately to be charged to loan account), and the total amount of the loans raised by the councils, during the year 1909-10, for the purposes of the various kinds of undertakings now under review, were: Tramways and light railways—Expenditure out of loans, £651,986; and receipts from loans, £529,528. Water undertakings—Expenditure out of loans, £1,366,317; and receipts, £1,271,653. Gas undertakings—Expenditure out of loans, £254,173; and receipts, £335,393. Electricity undertakings—Expenditure out of loans, £771,814; and receipts, £821,329. Therefore the total expenditure out of loans was £3,044,290; while the receipts amounted to £2,957,903. The total expenditure (including interest and dividends) on account of loan charges was £7,112,361. The loans outstanding were: Tramways and light railways, £22,424,596; water, £62,178,296 (in addition, a sum of £12,555 remained due at the end of the year to the capital funds of the councils in respect of money appropriated in lieu of borrowing); gas, £19,174,973; and electricity, £21,338,664 (in addition, a sum of £15,004 remained due at the end of the year to the capital funds of a council in respect of money appropriated in lieu of borrowing). These amounts made a total of £125,116,529 outstanding in the shape of loans. The sum remaining in sinking funds, loan funds, and redemption funds, at the end of the year, to provide for the repayment of the outstanding loan debt, was £7,230,025. The reserve, depreciation, and insurance funds established in connection with various undertakings amounted at March 31, 1910, to £4,630,777.

Based on the census of 1901 (and taking into account all alterations of area between that time and March 31, 1910), the total population of the 74 county boroughs was 9,787,779, and that of 253 other boroughs was 4,208,018—making a total of 13,995,797. The aggregate assessable value on April 1, 1909, for the purposes of borough rates, was £72,554,463. The rates raised during the year by councils of county boroughs averaged 5s. 8·9d. in the pound. In the case of the non-county boroughs, the average was 3s. 9d. in the pound where the councils were not the local education authorities, and 4s. 8·9d. where they were. The total amount raised was: In the county boroughs, £14,982,499; in the non-county boroughs, £5,017,180.

As has already been remarked, the total transfers from the accounts of tramway, light railway, and water, gas, and electricity undertakings in aid of rates, for the twelve months ending March 31, 1910, amounted to £1,024,782; while there were aggregate transfers from borough, district, or other funds to make up deficiencies in the revenue of such concerns to the extent of £338,302. The former amount was made up as follows: Tramways and light railways, £304,478; water, £110,750; gas, £490,470; electricity, £119,084. The deficiencies which had also to be made good were: Tramways and light railways, £61,228; water, £231,353; gas, £2726; electricity, £42,995. The largest amount of profit distributed in relief of rates was as usual derived from gas undertakings, which were, at the same time, responsible for far and away the smallest amount under the item of "transfers from other accounts to meet deficiencies in revenue."

Looking more closely into this portion of the Blue-Book, it is found that of the gas-works profits transferred in aid of rates for the twelve months now being considered, the amounts of £10,000 or over were: Birkenhead, £11,247; Birmingham, £75,459; Bolton, £20,000; Burnley, £12,159; Halifax, £10,902; Leicester, £36,203; Manchester, £50,000; Nottingham, £35,730; Oldham, £17,794; Rochdale, £10,000; Salford, £15,035; Southport, £13,000; Stockport, £15,000; Warrington, £13,720. In regard to electric lighting, there are the following cases of transfers of £10,000 or upwards: Birmingham, £10,008; Liverpool, £20,000; Manchester, £12,000; Nottingham, £17,250. In the matter of water-works, the instances of profits being transferred in aid of the rates are not nearly so numerous; but Kingston-upon-Hull figures for an amount of £12,000, and Leeds for £16,673. All the amounts quoted here relate to undertakings owned by the county boroughs. It may be pointed out the footnotes to the tables state that gas was supplied free to the public street lamps in Oldham, Rotherham, Wigan, Lancaster, and Dewsbury. At Smethwick, also, the expenditure on public lighting was borne by the Gas Department; and at Colne (Lancashire) the Gas and Electricity Departments of the Corporation bore respectively the cost of the gas and electric street lamps.

Glancing now at the columns in which the losses are set forth, and taking first the case of gas, it is seen that, out of the 105 gas undertakings owned by borough councils, the cases in which it has been necessary to transfer sums (and even then only small amounts) were very few and far between. Under Liverpool, for the portion of the area which the Corporation have in their hands, there appears a sum of £1526; the other instances being Sandwich £250, Appleby £150, and Pontefract £800. In the case of Wenlock, part of the expenditure on loan repayments, &c., was charged direct to the district fund. Electricity, of course, is not so well placed; there being nearly thirty instances among the 150 or so electrical undertakings in which deficiencies have had to be met. Some of the largest of these were Hastings £3802, Newport (Mon.) £1469, Stockport £2126 (transferred from the improvement fund to meet special expenditure), York £3394, Cardiff £9357, Gillingham £4812, Morecambe £2155, Loughborough £1500, Peterborough £1583, Kingston-upon-Thames £1639, Morley £1799. Under the heading of water undertakings, there are, as usual, a large number of instances in which losses were incurred. Some of the amounts involved are quite small; but others are substantial. The cases in which the deficiencies exceeded £10,000 are: Birmingham, £65,000; Halifax, £14,772; Huddersfield, £17,154; Swansea, £29,093; Southport, £12,192 (payment to Joint Water Board).

RUSTLESS COATINGS FOR IRON AND STEEL IN GAS-WORKS.

By Alwyne Meade, Assoc.M.Inst.C.E., F.C.S. (Miller Prizeman of the Institution of Civil Engineers, 1911).

The whole question of the corrosion of iron and steel is extremely complex even in its most simple cases; but, nevertheless, it is a question which demands a great deal of attention from engineers of all branches, and an absolutely effective method of preventing rust, applicable to every case, has yet to be discovered.

There are several theories—five at least—which have been put forward to account for the gradual erosion of iron; but it is now generally recognized that the "acid theory" is the most important, and that when the metal is situated in any position where it is subjected to the combined effects of moisture and acid gases, then the erosion will be most rapid. Evidently some galvanic action is set up, and, moreover, the destructive action is greatly assisted by the presence of dust from cinders, coke, and oxide.

Now, in a gas-works—particularly in a works where there are also chemical and water-gas plants—all of the above corrosive influences have to be contended with, and, in addition, they are present in comparatively large quantities. For this reason, the gas engineer in particular is continually face to face with a somewhat perplexing problem. He is forced either to be incessantly scraping his ironwork and applying fresh coats of paint to it, or else, as is more often the case, he merely lets the ironwork take care of itself, and renews it periodically when its appearance and instability warrant this.

It was in order to overcome the continued labour and expense involved in the upkeep of iron and steel work that the writer experimented with various methods of providing a permanent protective covering; and of these methods, the two following have proved decidedly satisfactory when applied under their respective conditions.

Sand Spraying.

With this method, a thin coating of fine silver sand is sprayed on to the paint while the latter is still wet. The paint is allowed to dry, another coat is then applied and again sprayed with sand, and finally a third coat is put on, but the sand is not sprayed on to this. When the whole has thoroughly dried, the sand combines with the paint and forms a hard shell, which is very much better able to resist the inroads of the rust-producing agents. This method is particularly adapted for use with mild steel plates and rolled steel beams; and in all cases the writer recommends that the particular object being treated should be thoroughly scraped and brushed with a wire brush, and a coat of red-lead paint—without the sand-spray—should be applied before the painting as suggested above is commenced. This coat should follow immediately after cleaning.

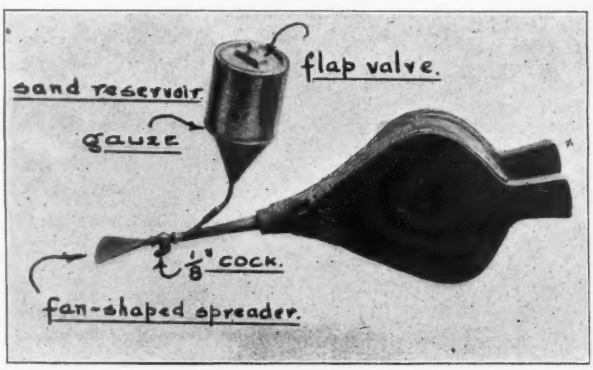


Fig. 1—The Sand Bellows.

As regards the apparatus for spraying the sand, nothing could be more simple. It consists (as can be seen from the photograph) of a pair of bellows, a tin sand reservoir, and a small gas-cock. The pipe from the reservoir leads into the blowpipe of the bellows, and a fan-shaped "spreader" is fitted to the bottom of the blowpipe. At the base of the reservoir is placed a gauze, which prevents the possibility of small lumps stopping up the feed-pipe; and to the underside of the reservoir lid is fitted a small flap-valve, which prevents the sand from being blown out at the top during the operation of spraying. The cock on the outlet-pipe is merely for regulating the quantity of sand used. There are no refinements about the apparatus, and nothing to get out of order. Moreover, it may be made complete for the modest sum of about 3s.; and the extra labour entailed by its use is negligible.

It is recommended that silver sand should be used; and this should be well dried by putting it in a bucket and heating it on a stove or gas-ring. A mixture of cement and sand was also tried. This, however, was found to be unsuitable.

Cement "Painting."

In some cases the above treatment was found to be of little use; and, under exceptionally severe conditions, the writer has adopted a method of cementing-in the ironwork. It has been found that steel work which exists in close proximity to sulphate of ammonia and sulphuric acid works is a source of continuous trouble, and all means of ordinary painting are of no avail. The instance which the writer has in mind at the moment is that of some steelwork which was used in the construction of Glover and Gay-Lussac towers. This material was subjected to particularly severe conditions. Not only were there heaps of oxide and coke-breeze in the vicinity of the towers, but, in addition, they encountered the full force of any sulphurous fumes from the chemical plants, and were situated on the brink of some "blow-off" bays, from which considerable quantities of exhaust steam were intermittently escaping. Needless to say, all attempts at painting proved abortive; and the many so-called patent acid-resisting paints were equally as unsuccessful as the spray-painting just described.

The writer then tried covering all the ironwork with a thin coating of reinforced cement; and this treatment is the only one

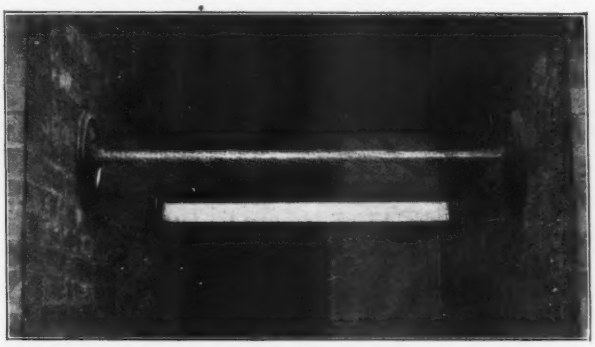


Fig. 2—Tie-Bars passing through Brickwork Piers.
[The one behind is completed; that in front is wired ready for cement.]

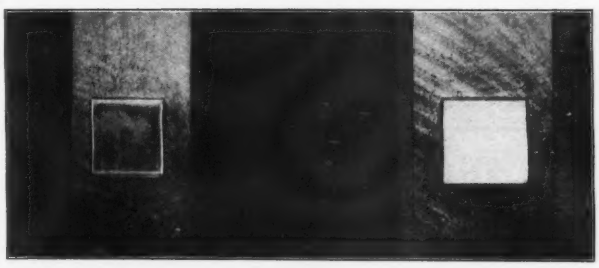


Fig. 3—Two Plate Washers, Nuts, and Bolts Covered.

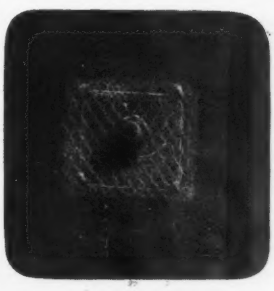


Fig. 4—A Plate Washer Wired Ready for Covering.

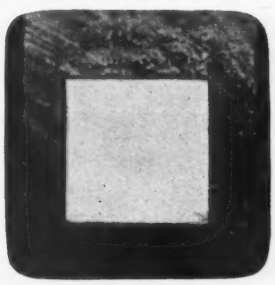


Fig. 5—A Large Plate Washer Covered.

Fig. 6—A Long Steam-Pipe.

which has stood the test and proved satisfactory. It should be mentioned that samples of the rust taken from these bars were found to be decidedly acid; and samples of dust, gathered from around the plant, also proved in the majority of cases to be slightly acid.

The process of cementing-in objects—such as tie-bars—was as follows. Firstly, they were thoroughly scraped and cleaned, then a long strip of wire-netting, ½-inch mesh, and about 4 inches wide—was wound loosely round the bar in the form of a spiral; the ends being securely fastened. A wooden trough—planed inside—was then fixed so as to enclose the bar, and stiff grout made up of neat cement was poured into the trough. When the cement was thoroughly set, the trough was removed and the bar was done with. It was found advisable to grease the inside of the trough before use, so as to ensure its easy removal and the formation of regular arrises.

Some large plate washers and nuts were also covered in a similar way; only in this case the wire-netting was bent back so as to form a cage, with the two sides about one inch apart, and each corner of the wire was attached to a long iron nail driven firmly into the woodwork.

The treatment has now been extended to the pipes in the neighbourhood of the chemical plants. In the case of steam-pipes, a layer of asbestos is first put on; then the spiral of wire-netting; and lastly a thin coating of cement. When covering steam-pipes, it is advisable that the steam should be allowed to pass through the pipe during the time the asbestos is being put on. But the pipe should be cold when being cemented; otherwise the covering becomes perforated.

Various mixtures of cement and sand have been tried; but none appear to be so satisfactory as the neat cement, and as the quantity used is so small, the extra cost is not worth consideration.

It was at first thought that the cement would be liable to crack and chip; but this has been found not to be the case. In fact, a tie-bar, 9 feet in length, was deflected 3 inches by pulling on it with a rope attached to a winch, and there was no outward sign of fracture in the cement, although the tension on its underside must have been considerable. In addition, while the bar was still deflected, the rope was severed so that the bar returned to its original position with a sudden jerk. This also failed to produce any effect.

As far as can be seen, the only objections to the treatment are that, compared with ordinary painting, the first cost is heavy, and objects, such as pipes, are inclined to appear somewhat unsightly. However, in answer to the latter objection, the writer would say that, in carrying out the experiments, he has considered preservation before ornamentation. As regards durability, time alone will tell; but from all appearances it would seem that the cement "painting" when once done properly will not require further attention.

The choice as to which of the two foregoing methods should be employed depends entirely on the conditions which prevail in the vicinity of the ironwork to be treated; and while the second method is applicable to nearly all cases—except flat plates—the first method is of little use under extreme conditions of steam and acid gases combined.

In no way is it to be supposed, the author desires to point out, that the sand-spraying renders the coating absolutely permanent; but it very materially prolongs its life, and tends to prevent peeling and the formation of blisters.

It should be borne in mind that even when embedded in neat cement, iron and steel are not really immune from attacks of electricity.

AUTOMATICALLY RECORDING THE SPECIFIC GRAVITY OF GAS.

By D. Chandler, of the South Metropolitan Gas Company.

In the "Journal" for Dec. 19, the writer noticed, with considerable interest, the description of an apparently simple yet ingenious instrument designed for the automatic determination of the specific gravity of various gases—one of the latest specialities of Messrs. Alexander Wright and Co.

It is a fact patent to every gas engineer that, with the various apparatus in the way of incandescent burners, gas-fires, &c., provided to meet the requirements of consumers to-day, it is desirable to supply gas of fairly uniform composition and density, in order to ensure the best results.

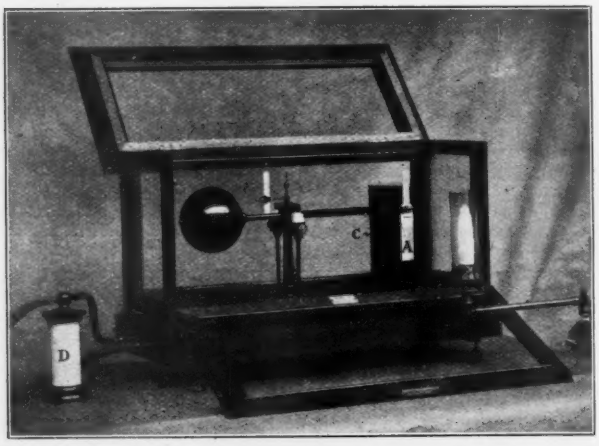


Fig. 1.

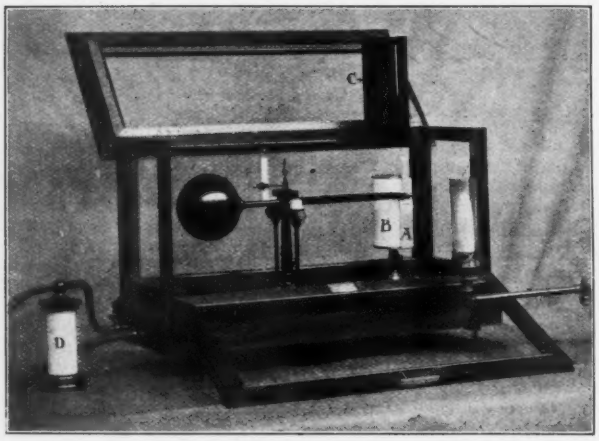


Fig. 2.

For such an instrument therefore as that illustrated and described last month there is, the author ventures to think, a widening field of usefulness. In this connection, the South Metropolitan Gas Company have for some time past been making experiments with the object of providing some method by which the specific gravity of the gas may be automatically recorded over any given period of time; and some interesting results have been obtained. A description of the arrangement, therefore, may now be desirable.

The apparatus consists of a "Lux" gravity-balance, to one end of which is attached a light metal shield A provided with a narrow horizontal slot. This slot is for the purpose of allowing the rays from an incandescent mantle to fall on to a chart of sensitized paper carried by the drum of the clock B arranged behind the shield. The shield rises or falls with the changing density of the gas passing through the globe of the balance. The clock carrying the sensitized paper is enclosed in a cylindrical metal case C, which is also provided with a long, narrow vertical slot, shown in fig. 2. The object of this case is to cut off all rays from the mantle except those passing through the two slots. The gas, after passing through a governor and filter D, is allowed to flow continuously through the globe at about 4 or 5 cubic feet per hour.

It may be interesting to point out that it was at first proposed to use a pen or pencil attachment for the purpose of obtaining a record; but both of these methods proved to be unsatisfactory, inasmuch as the loss of ink from the pen threw the instrument out of balance, and in the case of the pencil so much pressure was required against the paper as to make the instrument ineffective. The photographic arrangement, however [see chart reproduced in fig. 3], obviated both these difficulties.

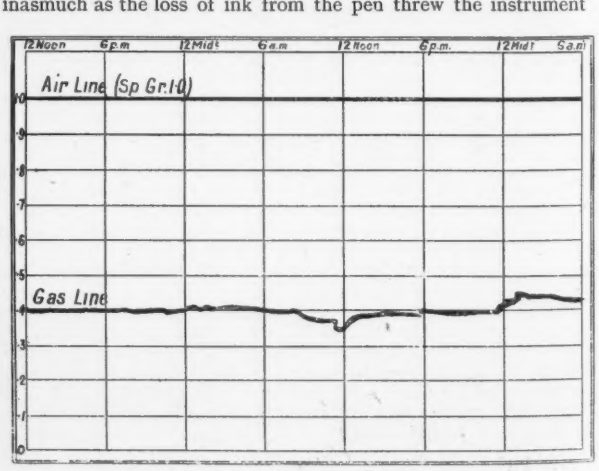
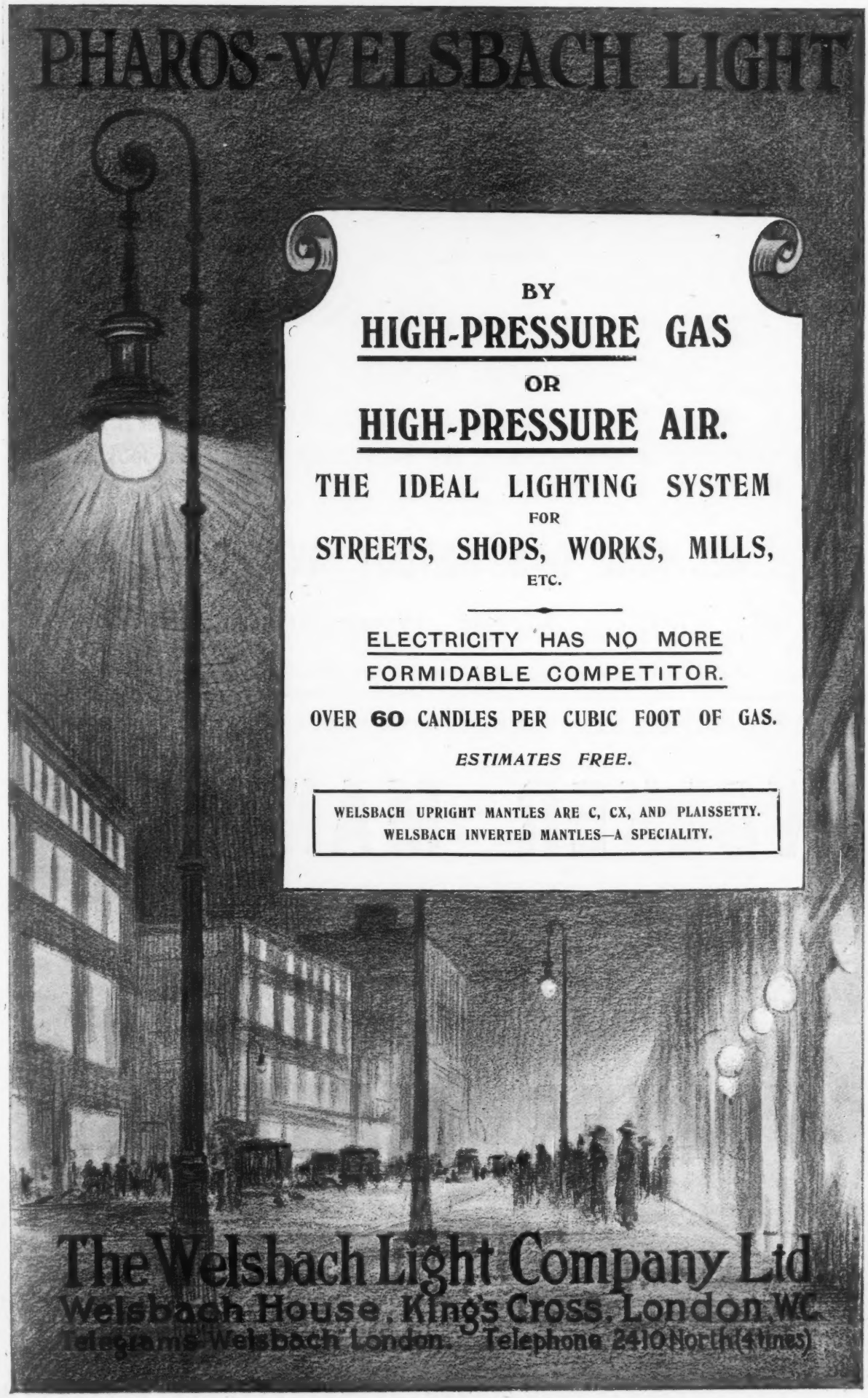


Fig. 3.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CHRISTMAS DECORATION OF A GAS COMPANY'S SHOW-ROOM.

An Effective Display at Weston-super-Mare.

We give herewith a reproduction of a photograph of the window of the show-room of the Weston-super-Mare Gas Company, as specially decorated for Christmas. It was taken at the beginning of the week immediately preceding the festival, at 11.30 p.m., when the Company's high-pressure lights were in use for the first time. There are four of Keith's 1500-candle power lamps; and there was consequently a brilliant display.

We learn from the Secretary (Mr. Percy E. Culling), to whom we are indebted for the photograph, that not only were large crowds attracted, but—what is better—that the Company have been inundated with orders for stoves, fittings, &c.

BOILER-FIRING AND METAL-MELTING BY SURFACE COMBUSTION.

[Extracts from Dr. Bone's Lectures to the American Gas Institute.]

When calling attention to the programme for the annual meeting of the American Gas Institute in October last, it was mentioned that Dr. W. A. Bone, F.R.S., Livesey Professor of Applied Chemistry in the University of Leeds, had been engaged to deliver his lecture on "Surface Combustion," with which readers of the "JOURNAL" are familiar from the reports which have appeared of his lectures at the Royal Institution early last year, and before the members of the Institution of Gas Engineers at their meeting in Glasgow in June. It will probably be remembered that Dr. Bone gave an interesting demonstration of the application of the system of surface combustion to the firing of boilers. This feature of the subject was brought prominently forward in the lecture to the American Gas Institute, which in other respects was mainly on the lines of those already published. Dr. Bone was, however, able to include in it new matter regarding the industrial applications of surface combustion which was not available when he was in Glasgow. It related to the design of a large boiler which has recently been erected by Dr. Bone and his colleague (Mr. M'Court) for utilizing coke-oven gas at the Skinningrove Iron-Works in Cleveland (Yorks.), and to a very successful method they have evolved for melting lead, type metal, and other similar metals and alloys. This portion of the American lecture, which was illustrated by lantern slides, is given to-day.

BOILER FOR UTILIZING COKE-OVEN GAS.

The boiler itself (fig. 1) is a cylindrical drum, 10 feet in diameter and only 4 feet from front to back. It is traversed by 110 tubes, 3 inches internal diameter, which are packed with fragments of fire-brick. The boiler will be worked under the suction of a fan capable of producing a suction of 20 inches water-gauge. To the front of the boiler is attached a device whereby gas at 2 inches water-gauge pressure from a feeding chamber, together with a proper proportion of air from the outside atmosphere, is drawn (under the suction of the fan) through a short mixing-tube into each of the 110 tubes of the boiler, where it is burnt without flame in contact with the incandescent granular material. The products of combustion, having traversed the 4-feet length of packed tube, will pass outwards into a semi-circular chamber at the back of the boiler, and thence through a duct to the tubular feed-water heater, which is depicted in the second photograph (fig. 2). The fan, which is attached to this feed-water heater, will suck out the cooled products, and discharge them through a short duct into the atmosphere outside the boiler-house.

I have perhaps already said enough about the boiler and its working to convince you that it at least gives promise of combining structural simplicity, high thermal efficiency, and concentration of power in a degree which is absolutely unique. From the constructional point of view, nothing could be simpler or more compact than a cylindrical shell only 4 feet long by 10 feet in diameter, supported on a casting, and requiring neither elaborate brickwork setting nor chimney. It has the further structural advantage over all other multitubular boilers in that the front plate can never be heated beyond the temperature of the water,

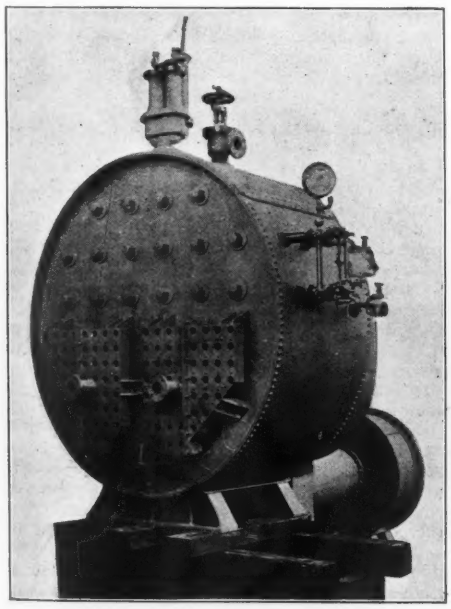


Fig. 1.

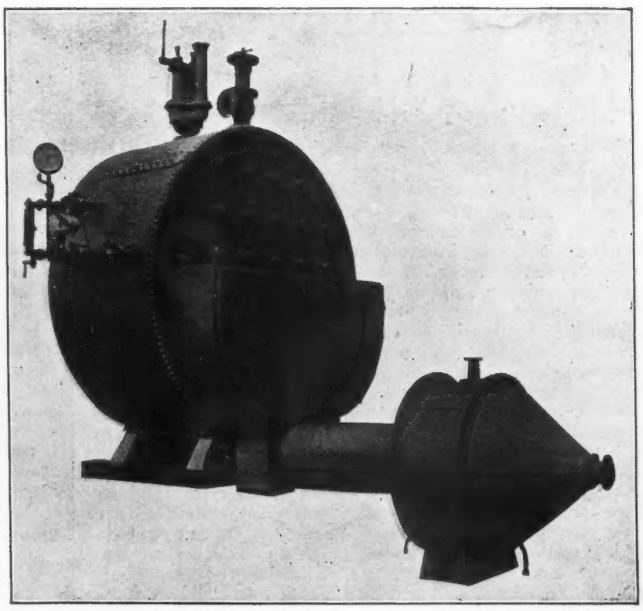


Fig. 2.

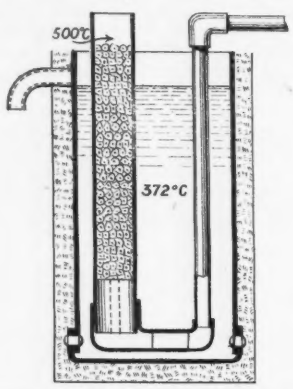
however much the firing may be forced—a circumstance which, coupled with the extremely short length of the tubes, implies an absence of strain, and greatly reduces the risk of leaky joints.

Another feature of the boiler which makes for efficiency is the steep "evaporation gradient" along the tubes. Under the normal working condition, the "mean evaporation" exceeds 20 lbs. per square foot of heating surface, or about twice that of a locomotive boiler. Of the total evaporation, no less than 70 per cent. occurs over the first part length of the tubes, 22 per cent. over the next part, and about 8 per cent. over the third part. Such a steep gradient causes a considerable natural circulation of the water in the boiler—a factor of great importance from the point of view of good working.

In regard to thermal efficiency, I venture to claim that a boiler unit which, while evaporating 20 lbs. of water per square foot of heating surface, transmits upwards of 90 per cent. of the net heat of combustion of the gas to the water, and which, if need be, can be forced to a 50 per cent. higher duty with only a slight drop in efficiency, stands unrivalled as a steam-raiser. Moreover, in the case of a large boiler of (say) 100 tubes, "elasticity" may be conferred by arranging the tubes in groups, so that they may be either fired-up or conversely shut-off group by group, successively, in correspondence with variations in the load. Indeed, I want no more practical demonstration of the validity of my views on surface combustion than this boiler.

Metal-Melting by Surface Combustion.

It will be readily understood that the principle embodied in the boiler is capable of great extension—for example, (1) to the preliminary concentration of dilute solutions and the heating of liquids generally; (2) to the heating of large volumes of air; and (3) to the melting of metals and alloys. Unfortunately, time does not permit of my dealing with these further applications in every detail. I should like, however, to refer briefly to the results of our experiments upon the fusion of metals. Our attention was first drawn to this subject by officials of one of the London Gas Companies, who represented to us that there would be a large field of usefulness for our process in the melting of type metal for newspaper purposes. The printing of a newspaper of large circulation necessitates a continuous supply of molten type metal; and we are reliably informed that several of the leading London newspapers require 20 tons of molten type metal continuously at hand during 16 out of the 24 hours. In the experiments which I now propose to describe to you, lead has been used instead of type metal; but the method is applicable to all metals or alloys of which the fusion-points lie below about 600° C. (1112° Fahr.).



Gas Consumption equalled 100 Cubic Feet per Hour, N.T.P. Calorific Value of the Gas was 559 B.Th.U. net. Lead at 15° C. was heated to 372° C., or equal to 1176 lbs. per Hour.

Fig. 3.

The diagram before you (fig. 3) represents an iron tank, efficiently lagged, and filled to the top with molten lead at a temperature some 50° or thereabouts above its melting-point. In the molten bath is fixed an iron tube some 2 or 3 feet in length, and 3 inches internal diameter. This tube is packed (like one of the boiler tubes) with a suitable granular refractory material, and there are suitable arrangements for the introduction of the explosive mixture of gas and air which is to be burnt in the tube. When once the device has been started-up, it will work for days together without stopping. Solid lead is continuously fed into the apparatus, and the molten metal is allowed to run over through the spout indicated in the illustration. For the sake of simplicity, I have described and illustrated a small tank fitted with one combustion tube; but experiments have been carried out with tanks holding up to 8 tons or more of molten metal, in which a series of combustion tubes are fixed. By means of such an apparatus, lead (or other fusible metals or alloys) may be melted not only very rapidly, but with extraordinary efficiency. As an example of this, I will quote the results of a test carried out at our experimental station with a single-tube apparatus. These may be conveniently tabulated [see next column].

The conditions of the test were so arranged that the mean temperature of the molten metal in the apparatus (as ascertained by a thermo-junction) was 372° C. throughout the test. Lead ingots,

	Deg. C.	Deg. Fahr.
Temperature of metal charged	15	60
Temperature of metal tapped	372	682
Temperature of gases leaving apparatus .	500	932

Lead melted per hour = 1176 lbs.
Heat required per hour to raise metal from 15° C. to 372° C. = 1176 × 32·67 = 38,420 B.Th.U.
Gas burnt per hour = 100 cubic feet at N.T.P.
Net calorific value of gas = 559 B.Th.U. per cubic foot at N.T.P.

$$\text{Ratio} = \frac{38{,}420}{55{,}900} = 0{\cdot}686.$$

each weighing about 30 lbs., were added at intervals of 1½ minutes. The molten metal displaced was simultaneously run off into moulds. Great care was taken to keep the bath thoroughly molten, and at a temperature within a few degrees of the mean value. Burning gas, of the net calorific value 559 B.Th.U. per cubic foot, at the rate of 100 cubic feet per hour, it was found possible to raise the temperature of 1176 lbs. of lead per hour from 15° C. to 372° C.; the temperature of the products of combustion leaving the tube keeping constant at 500° C., or only 128° C. above the temperature of the molten metal.

From the latest determination by Spring of the specific heat of lead at temperatures up to and above its melting point, and adopting the usually accepted value for the latent heat of fusion of lead, I calculate that the heat required to raise the temperature of 1 lb. of lead from 15° C. to 372° C. (including melting) is 32·67 B.Th.U. Therefore, the heat transmitted to the lead per hour during the experiment was 1176 × 32·67 = 38,420 B.Th.U.; whereas the net calorific value of the gas burnt per hour was 55,900 B.Th.U., the ratio 38,420 ÷ 55,900 = 0·686. Inasmuch, however, as the net heat of combustion of the gas is based on the assumption that the products of combustion (less steam) are cooled down to 15° C., whereas in the experiment the temperature of the molten metal was 372° C., it follows that the high ratio of 0·686 does not do full justice to the merits of the system. Under ideal conditions, the temperature of the gases leaving the combustion tube could not have been reduced below 372° C.; they were actually reduced to within 130° C. of this ideal temperature.

Taking these circumstances into consideration, I calculate that the efficiency of the melting operations was practically 80 per cent. of that theoretically possible. Perhaps a more succinct way of stating the remarkable efficiency of the lead melting is to say that a ton of lead, charged cold, can be melted and raised to 50° C. above its melting-point with an expenditure of 200 cubic feet of coal gas (N.T.P.) of the net calorific value of 559 B.Th.U. per cubic foot. With gas at 2s. per 1000 cubic feet, the cost of gas would be just under 5d. per ton of lead. The balance of 20 per cent. would be made up of (1) heat carried off in the waste gases which, under ideal conditions, might have been utilized; and (2) radiation losses.

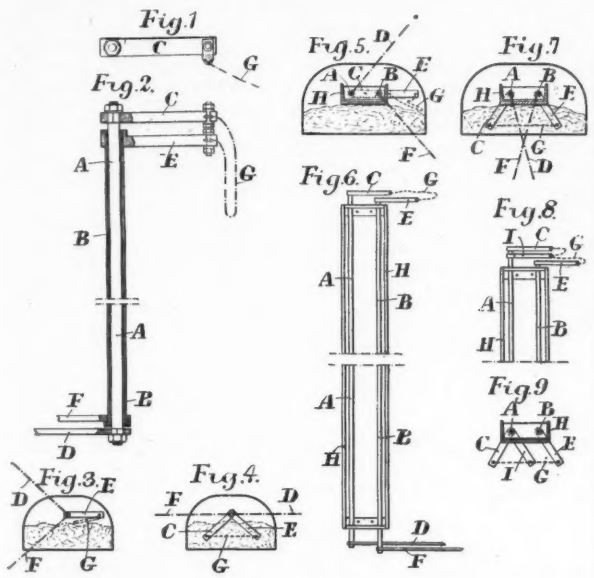
In concluding his lecture, Dr. Bone expressed his great obligation to the authorities of the University of Leeds and of the Imperial College of Science and Technology for granting him leave of absence from his teaching duties and engagements, in order that he might appear before the members of the American Gas Institute. He explained that the University had formed a very close association with the coal-gas industry in Great Britain; and the endowment of the Chair which he had the honour of occupying, in memory of the late Sir George Livesey, was the sign and seal of this alliance. He said those who were connected with the University attached great importance to the organization and development of its departments of Applied Science; and he was authorized by his friend Professor Smithells, the Pro-Vice Chancellor and Dean of the Faculty of Science, whose researches on the structure and chemistry of flames were known to all gas engineers, to convey to the American Gas Institute cordial greetings from the University.

By way of supplementing the particulars furnished by Dr. Bone in his lecture, it may be mentioned that the boiler referred to was successfully started on the 7th of November for a month's continuous run, after which it was shut down for an official inspection. It ran without a hitch for the entire trial period. The average temperature of the waste gas leaving the feed-water heater was only 75° C. (187° Fahr.), which was lower than that obtained with the experimental boiler at Armley. The boiler at Skinningrove was supplied with water of 5° of hardness; but we learn that there were absolutely no signs whatever of "priming," and when the boiler was finally opened for its official inspection, it was found that there had been no scaling of the tubes. On the contrary, the scale had been shed continuously from the tubes as fast as it formed. This is quite a new feature in boiler experience, and one which is considered to be due to the very high rate of evaporation obtained on the surface of the tubes—a rate which is apparently more than sufficient to prevent any adherence of scale. The consequence is that the scale is continuously shed in extremely thin films (about 1-30th of an inch thick) to the bottom of the boiler, where, of course, it is perfectly harmless. The photographs of the boiler and feed-water heater were taken at the works of the constructors (Messrs. Richardsons and Westgarths, of Middlesbrough); but they do not show either the gas connections up to the boiler or the suction fan which serves to draw the gaseous mixture through the tubes. It will be seen from the details given that the boiler is worked under the suction principle, which is found in practice to be highly efficient.

RAKE FOR DRAWING RETORTS.

The Compagnie Anonyme Continentale pour la Fabrication des Compteurs à Gaz et Autres Appareils, of Paris, have taken out a patent for an appliance to allow of the drawing of a retort in a single operation. The following particulars are translated from the French specification.

The appliance consists of a rake having two or more blades or scrapers, which are superposed or brought close together, when introduced into the retort, and then moved apart behind the coke lying at the end. By pulling out the rake, all the rear surface of coke can be attacked, and the drawing finished in one operation.



The rake, with multiple blades or scrapers, is represented, in various types, in the accompanying illustration. Fig. 1 is an end view of a rake with two scrapers; and fig. 2, a plan in section. Fig. 3 shows the position of the rake when it is introduced into the retort; and fig. 4, the rake with the scrapers opened out. Fig. 5 is a transverse section of a rake with two scrapers as it is when about to be put into the retort; fig. 6 is a plan; and fig. 7 a similar section to fig. 5, showing the open scrapers behind the coke. Fig. 8 is a plan of a three-scraper rake ready for being put into the retort; and fig. 9 is a transverse section of the same rake with the scrapers opened out.

The appliance shown in figs. 1 to 4 consists of two rakes, the rods A B of which are concentric. Rod A of the first rake is provided with a scraper C and lever D, which has a handle. Rod B of the other rake is a tube into which rod A runs, so as to turn freely. The hollow rod B has a scraper E and a working lever F. The two scrapers are united at their extremities by a loose chain G. The rake is introduced into the retort, the two scrapers being superposed as in figs. 1 and 3, and the two levers in the relative corresponding positions (fig. 3). When the rake, passed over the coke, reaches the end of the retort, the two levers have to be worked so as to bring them into the respective positions indicated in fig. 4—the rod A of one rake pivoting in the tube B of the other. Then the two scrapers take up, behind the coke, the positions shown in fig. 4; the chain being drawn out between them. When the rake is pulled by the aid of a winch or tackle, the entire mass of coke comes out at once. The two rake-rods can be placed one outside the other, as in figs. 5 to 9, in which case their point of support is inside a channel-iron H, which is closed at the extremities with inserted angle-irons, secured with rivets or otherwise. These angle-irons guide rods A B, and keep them apart.

In the type of rake shown in figs. 8 and 9, a loose scraper I is mounted on one of the rods, which is connected with the two others by the chain G, so that by moving the two scrapers C E apart, the scraper I goes into the intermediary position as shown in fig. 9. The number of these loose scrapers can be increased. As a support for the rake, a stirrup could be utilized, with a grooved roller, to support the rake while it is being pushed into the retorts.

Recent Wills.—Mr. George Banbury, whose death was recorded in the "JOURNAL" for the 28th of November, left estate of the gross value of £108,268, of which £107,683 was net personalty. Mr. John Kitson, whose death on the 5th ult. was noticed shortly afterwards, left estate valued at £200,030 gross, with net personalty sworn at £118,918. Colonel Sir Samuel A. Sadler, late M.P. for Middlesbrough, who died on Sept. 29, left £20,088 gross and £10,173 net.

VICTORIAN GAS MANAGERS' ASSOCIATION.

Pending the receipt of the full report of the proceedings which we shall hope to be in a position to publish in an early issue, we are indebted to the Melbourne "Argus" for a few particulars of the sixth annual meeting of the Victorian Gas Managers' Association, which was opened on Nov. 8, at the rooms of the Engineers' Institute in Swanston Street, Melbourne. The chair was occupied by Mr. D. Warren (of Footscray), the Acting-President; and there was an attendance of 45 members—there being representatives of gas undertakings in Victoria and other States, and New Zealand. Several new members were elected.

The Chairman, in the course of his opening address, referred to the fact that 1911 was the centenary of the formation of the first Gas Company in London. On the subject of municipal gas control, he stated that, out of 1225 gas undertakings in England, 226 were owned by municipalities; out of 263 in Scotland, 57 were owned by municipalities; and 25 out of 110 undertakings in Ireland were municipally owned. There were 153 gas companies in Australia and New Zealand, and 52 in Canada.

A paper was read by Mr. P. C. Holmes Hunt, Engineer of the Metropolitan of Melbourne Gas Company, on "Modern Carbonizing Systems." The author pointed out that he had visited America, England, and the Continent, and had inquired into the system of gas making by vertical retorts. He referred to the fact that installations were being put up in Melbourne—one in South Melbourne and another in the West Melbourne works—while similar retorts were being installed in New Zealand.

The members of the conference had dinner at the Masonic Hall, on the invitation of Mr. Warren. They afterwards visited the Colonial Sugar Company's works on the Yarra river, and the Footscray Gas-Works.

The proceedings were continued on the following day.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

The members of the Western District Section of the Scottish Junior Gas Association held their annual social gathering in Sloane's Café, Glasgow, on the evening of the 23rd ult. There was a large and representative attendance of both seniors and juniors. The President (Mr. James M'Ghee) occupied the chair; and among those present were Bailie Kirkland, the Sub-Convener of the Glasgow Corporation Gas Committee, Councillors M'Ewan and Turner, members of the Committee, Mr. Alexander Wilson, the Gas Engineer and Manager to the Corporation, Mr. G. R. Hislop, of Paisley, Mr. James M'Leod, of Greenock, Mr. S. B Langlands, of Glasgow, and Mr. J. R. Moyes, the President of the Eastern District Section of the Association.

After dinner, a programme of songs and readings by members and friends was gone through; and during the evening, several toasts were proposed and duly honoured.

Bailie Kirkland proposed "The Scottish Junior Gas Association—Western District," coupling with the toast the name of the President. Having apologized for the absence of Bailie Paxton, the Convener of the Gas Committee, he referred to the objects of the Association, which he said were laudable; and he expressed his pleasure at learning that the membership was about 200, though the organization had been in existence only seven or eight years. He alluded to the facilities the Glasgow Corporation were giving for their employees to learn everything connected with gas manufacture and distribution, and concluded by advising the members to avail themselves of all the opportunities provided by the Association for visiting other works.

Mr. M'Ghee, in responding, said the Association had been able to visit many works of the latest design; and the members had profited thereby. The papers submitted during the existence of the Association had been of good quality; and he thought it was for the benefit of the gas industry as a whole that papers should be read and discussed. He considered that the Junior Associations would not reach their maturity until they were in close bond with the Senior Associations, either by affiliation or otherwise.

Mr. G. R. Hislop proposed "Kindred Associations," and spoke of the brotherhood existing between the members of the Gas Institutions, and of the good obtained by mutual intercourse, as instanced by the admirable papers read from time to time in order to expose error and propound truth.

Mr. Alex. Wilson, in replying to the toast, said it was one that was always acceptable, for the brotherhood existing between gas men all over the world was shown by the interest and courtesy displayed in the interchanges that took place between ourselves and our friends in other countries.

At this point, Mr. G. Scott, of Glasgow, was presented with a medal, the gift of Mr. J. D. Smith, the Gas Engineer and Manager of the Belfast Corporation, to the author of the best paper read during the session of 1910-11. Mr. Scott, in returning thanks, advised all the members to undertake the writing of a paper, which he said they would find very beneficial.

Another feature of the evening was the presentation of the Association Medal to the Past-Presidents. Mr. James Bell (Kirkintilloch), as the Senior Past-President, returned thanks on behalf of himself and his colleagues.

PORTLAND CEMENT ON PUBLIC WORKS.

By Gerald Thornhill Edwards, Assoc.M.Inst.C.E.

[Some Extracts from a Paper Read before the Institution of Water Engineers, Dec. 8.]

Not very long ago engineers were content to specify simply that cement used on contracts under their charge must be obtained from an approved firm of manufacturers, and were also further content, when the clause had been fulfilled, to pass any cement the makers cared to send. Nowadays, on public works of any size, every consignment of cement received is thoroughly tested on the works, generally under the almost direct supervision of the resident engineer. In his paper, the author enumerated the different tests which should be carried out in order to ensure only perfectly sound cement being used—explained why such tests are necessary; and he, further, commented generally on the properties and use of Portland cement.

The author described what he considered to be a proper cement-testing laboratory; and coming to chemical analysis, he said a representative sample from each parcel of (say) 50 or 100 tons, should be analyzed, and the result compared with the specified analysis. The usual proportions of the principal component parts of Portland cement are lime, 62 per cent. to 65 per cent.; silica, 18 per cent. to 20 per cent.; and alumina, 6 per cent. to 8 per cent. The analysis should not show more than 3 per cent. of magnesia, 2·75 per cent. of sulphuric anhydride, and 1 per cent. of insoluble residue. The principal development of recent years has been the increased percentage of lime in the better class cement. A few years ago 60 per cent. was considered the outside limit; while it is quite common nowadays to find sound cement containing 64 per cent. of lime. Care should be taken, however, that no more lime is contained than will combine with the silica and alumina present; and the chemical formula for this, given in the British standard specification, should be complied with, otherwise free lime will be found in the product. Some manufacturers vary the percentages of alumina and silica to suit the "set" required; a low percentage of alumina is generally found in a slow-setting cement. The specific gravity should be not more than 3·25 and not less than 3·15 when the cement is freshly ground.

In regard to fineness, the specification of modern engineers would have filled with dismay the manufacturers of twenty years ago. At the present time, it is quite common to specify not more than 10 per cent. residue on a sieve having 32,400 meshes to the square inch. The author also laid emphasis on the importance of initial set tests. Until recently, the initial set has been very much neglected by British engineers, who have been content to specify the limits of the final set only. But the initial set is now being recognized as of primary importance, and that of any consignment of cement should be regulated according to the conditions under which it is to be employed. Thus, if an engineer is putting in concrete under water, he should order quick-setting cement; and if he is building a dam where the wet concrete is shovelled about, punned, and trampled upon for an hour after mixing, he should order a slow-setting cement. In other words, the time between the gauging and initial set must be longer than the interval necessary to allow of the concrete being placed in its final position.

As to the test for shrinkage, a mould tapered from $4\frac{1}{16}$ inches diameter at top to 4 inches diameter at bottom is used. The reason for the taper is that, if made so, a test for shrinkage may be carried out with little trouble. After describing this, he said it was only necessary to touch lightly on the question of final set, because it is of very little practical use, and also because the method of conducting the test is unscientific and arbitrary. A test that meets his approval is to ascertain the pressure necessary to penetrate with a standard drill a standard distance into the block. by this method the time necessary for any cement to attain a standard degree of hardness can be ascertained. The soundness and other tests came in for comment. In referring to tensile tests, he said that, in calculating the strength of any concrete structure, engineers assume that concrete offers no resistance at all to tensile stress. On the other hand, the breaking stress of concrete in compression is very important, and enters largely into any problem relating to the safety of the structure. Yet, the almost universal practice, in drawing up a specification for cement, is to state that briquettes at a certain age shall resist a tensile stress of a certain amount; the theory being that the tensile strength is closely related to the compressive strength. His argument leads to the question how can it be maintained that the tensile test gives any idea of the compressive strength of concrete? Apparently, the only reason for continuing the tensile test is that it enables the engineer to form an idea as to how a particular consignment of cement compares in tensile strength with the established standard strength. But even here much depends on the skill of the man who makes the briquettes; for the difference between two of the averages at seven days is about 30 per cent. More important, however, is the fact that the tensile test will altogether fail to reveal a defect that unfortunately appears occasionally in some of the modern cements—namely, the hardening of the outside skin while the interior of the cement remains quite soft. A tensile briquette has a periphery of four inches, while its cross section is only one square inch; so that, assuming each of the four surfaces hardens, the strength of the briquette will be almost as high as if it had hardened right through.

A test of the initial hardening of Portland cement is urgently needed and would be very useful. Setting and hardening are not synonymous terms. The two properties are totally different, and seem, in point of time at any rate, to have no connection with each other. But there is a sort of general law, which has been established by numerous experiments, that, given two samples of the same make of cement, one quick setting and the other slow setting, the quick setting is the slower hardening. Possibly an extreme instance of this was obtained by testing two samples of one maker's cement. The initial sets of these two samples were as far apart as 16 minutes and 8 hours; but at the end of 24 hours the slow-setting sample was many times harder than the quick setting. Again, there is an extraordinary difference in the rate of initial hardening of various makes of cements; and the difference is perhaps even more noticeable in various blends of rotary and chamber kiln cement from the same works.

For structural concrete work over centres, between shutters, and in deep heavy trenches, a quick hardening cement is essential. In placing a contract for such work, the usual practice hitherto has been to order a quick-setting cement, under the impression that this would ensure quick hardening. But this has been proved to be quite an erroneous idea, although some quick-setting cements may give good hardening results. It is impossible to know whether a cement hardens quickly or slowly unless it undergoes a hardening test.

The question whether cement should or should not be aërated is always a bone of contention on big public works. Up to quite recently, most engineers specified that all their cement should be aërated. In fact, aëration was looked upon as the panacea for all the ills and weaknesses that cement is subject to; and this deservedly so, for there is hardly a fault or defect not curable by aëration for a longer or shorter period. Apart from any advantage gained in the quality of a cement by aëration, comes the question, is it economical? It is, of course, a well-established fact that aëration increases the bulk of dry cement; but what may not be so well known is that cement also increases in weight during aëration, through absorption of moisture from the atmosphere. Further, aërated cement requires more water to combine properly than non-aërated, Experiments show that, due to aëration only, the increase in weight is 3 per cent., in bulk 11 per cent., and in bulk of neat cement mortar $8\frac{1}{2}$ per cent. By the courtesy of Mr. G. N. Yourdi, M.Inst.C.E., the author is enabled to state, in relation to the aërating shed of the Birmingham Corporation, in the Elan Valley, that there were booked out of the shed about 2000 tons more than were received into it. Therefore, on paper, the gain in passing through the shed was (say) 2000 tons, or $1\frac{3}{4}$ per cent. This apparent gain may or may not have been wholly due to aëration. The bags sent out of the shed were supposed to be full weight, and liable to be checked at any time by one of the engineers. Then, again, considerable waste often occurs in an aërating shed, due to the flour being carried away by the draughts, or on men's clothes and railway waggons. Take the figures given by the experiments, and assume that 10,000 tons are wanted by a contractor, and, further, that the cement has to be measured, when making concrete, by volume. Aëration would increase his 10,000 tons to 10,300 tons, and would make this 10,300 tons, owing to the increase in bulk of 11 per cent., go as far as 11,400 tons of non-aërated cement. So that aëration saves him the cost of 1400 tons at (say) 30s., or £2100. The cost of aëration at 9d. per ton would be £375; so that the saving would be £1725.

The author strongly deprecates the existing practice of measuring cement by volume instead of by weight. It affords an astute contractor a splendid opportunity of making a handsome, and perfectly legitimate, profit at the expense of the quality of the work.

To sum up, an attempt is made by the author (1) to explain the uses of chemical analysis, fineness, initial set, and soundness tests; (2) to suggest a simple and easily carried out shrinkage test; (3) to show that the final set test and tensible tests are unreliable and of no practical value, and that their place should be taken by a hardening test, which is necessary for other reasons; (4) to justify aëration on economic grounds; (5) to point out the absurdity of specifying that cement shall be measured by volume.

Discussion.

The President (Mr. Edward Sandeman) said he was afraid it was rather difficult for anyone who had not had to deal with large masses of cement to discuss the paper. There were many interesting points in it; and one of the most interesting referred to the matter of quick-setting cement being a slow-hardening one. This was really a remarkable feature, because it had been the accepted view that a quick-setting cement was a quick-hardening one. It was quite an anomaly. He (the President) thought it would be found in practice that, as Mr. Edwards said, if one wanted a cement for use in tunnelling work, where concrete was employed to support the roof, a quick-setting cement should not be used, but a slow-setting cement which was quicker in hardening, because what was wanted was immediate strength. There was one interesting experiment Mr. Edwards had not referred to. It was made some time ago; and it showed in what way they could find out interesting matters connected with cement by observation even on a small scale. He referred to the initial set of cement. On his own works, they had had several batches of

cement which varied very much. With rotary cement, it was found that the initial setting point was almost immediate. It set almost as soon as it was mixed with water; whereas the old chamber cement took about ten minutes ordinarily when new. They had some cement which had an initial set of three minutes and some which had an initial set of about fifteen minutes. It struck him as an interesting point to be tested, what would happen if one used together these two cements with different initial sets. An experiment was made by putting half of the one and half of the other together; and it produced a cement which set in nine minutes. So far as could be observed, there seemed to be no disadvantage in mixing the cements with different initial sets of this sort. Since the introduction of rotary cement, there had been several changes in the behaviour of cement. In the first place, the initial set, as he had pointed out, had become quicker; and it was necessary now, if new rotary cement was used, either that it should have been dealt with by gypsum, thus lengthening the set, or that it should have been hydrated, or that the clinker should be hydrated. Rotary cement, as it came from the mill, was almost useless. Another curious point was that of shrinkage. He did not remember with the old chamber cement that shrinkage was observed; but since the introduction of rotary cement, they had noticed it in some samples.

Dr. H. LAPWORTH (Derwent Valley Works) remarked that most of them had found the old cement tests were unsatisfactory; but no one had been able to remedy them. The late Dr. Deacon did not believe in tension tests; and he had a very elaborate compression test which gave satisfactory results. The hardening tests described by Mr. Edwards were new; and he (Dr. Lapworth) believed in them.

Mr. J. S. PICKERING (Cheltenham) said the author had referred to shrinkage tests. His suggestion of the taper ring to ascertain the shrinkage was novel, so far as he (Mr. Pickering) was concerned. It seemed to him, however, to be a simple and effective method. The various suggestions in the paper were very valuable, particularly those relating to the hardening tests. They all found that some such test as that was very desirable. He did not, however, agree with the author that one could get almost an equally good tensile test by merely hardening the periphery of a briquette as one would by a thorough hardening. The tensile strain must depend upon the consistency of the hardening throughout. He thought the time would come when it would be felt that the cement which was supplied from the manufacturers by the latest process of manufacture might not necessitate aëration. He did not think it necessary to advocate aëration merely on economical grounds, except in very large works; and even there he did not believe it was worth all the labour put into it. He also thought it an important point in mixing concrete to specify the weight of the cement, instead of the volume. It was a practice they ought all to adopt. The present method of specifying the proportions by volume should be changed to weight.

Mr. ASHTON HILL (South Staffordshire Water-Works Company) alluded to the drills used by the author, inquiring how he found them answer. Cement was not a nice material to drill; and it seemed to him, if he drilled many samples with the same drill, he would get different results with only the same weight on it.

Mr. EDWARDS said they had had a drill working every day on about six samples for over three months; and the difference was very slight.

"Transactions" of the Société Technique.

We have received the volume of proceedings of the Société Technique du Gaz en France for the past year. It contains the report of the thirty-eighth annual congress, held at Marseilles from the 22nd to the 24th of May, under the presidency of M. Henri Marquisan, a Director of the Marseilles Gas and Electricity Company. Most of the technical matter in the volume has already been noticed in the "JOURNAL." The papers are illustrated by numerous diagrams and by seventeen plates. The reports of the Special Committees of the Society, abstracts of which have appeared in our columns, are included, as well as the report of the Committee appointed to test appliances for the domestic use of gas submitted in the competition last year. A long report, occupying about 70 pages, is given of the third meeting, held in Paris in October, 1910, of the Commission on the international unification of screw-threads. Particulars are furnished of the competitions for the prizes for the current session, the names of the recipients of those already awarded are given, and also the names and addresses of the members, &c. In a supplement will be found a tabulated synopsis of the technical abstracts which have appeared in the "Revue Bibliographique," started by the Society in 1908. This is followed by a review of the legal business of the year 1909-10 by M. de la Taste; and the index to the cases noticed as far back as 1884 is brought up to Aug. 6, 1910. The volume has been produced under the supervision of M. Bouron, the Permanent Secretary of the Society.

The Halifax Appointment.—Out of the 63 applicants for the position of Gas Engineer to the Halifax Corporation, rendered vacant by the removal of Mr. Wilkinson to Nottingham, four were selected to appear before the Gas Committee, with the result that they decided to recommend Mr. W. B. M'Lusky, of Perth, for appointment by the Council, at a commencing salary of £500 per annum.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Our Questions and How Far They Are Answered.

SIR,—I regret that you have not thought fit to deal with my remarks at once.

I had purposely dealt only with the questions which you put, because I want to separate that from the figures. I do not wish to confuse the issues; and you say that you also wish to keep them clear. Therefore I make the request that, when I send the remarks on your figures, you will confine your remarks—that same week—to the figures and not to opinions. I have already stated that I consider some of the views expressed by me in October require modification, as the result of further enquiry. What I am anxious to obtain are figures—unless, of course, it is hopeless to get at the exact costs. It should be possible, if difficult.

"ENGINEERING CORRESPONDENT" OF THE "DAILY TELEGRAPH."
Dec. 28, 1911.

[We cannot in any way be dictated to as to how or when we shall reply to our correspondent's letters. We have fully determined to deal with them in the whole when he has informed us that he has come to the end of all that he has to advance in justification of the original article, instead of allowing the matter to ramble along in this leisurely fashion. It must be said that we and others are getting a little tired of knowing that week after week is passing with the "Golden Lights" article and its misrepresentation still standing in the columns of the "Daily Telegraph" without any proper acknowledgment on the part of its author that the views he widely circulated among the public, as they affect the gas industry, were unsound and incapable of justification. However, we hope to speedily see some retractation published. "Engineering Correspondent" does not tell us whether his answers Nos. 9, 10, and 11 as given last week sum up the whole of his knowledge and the evidence he possessed when he wrote and published, in the columns of the "Daily Telegraph," the statements to which they refer. We have a particular reason for desiring to measure up that knowledge and evidence,—ED. J.G.L.]

The Official Verification of Gas-Meters.

SIR,—With your permission, I should like to offer a few remarks, from the point of view of an official inspector of gas-meters, on the article on "Statutory Gas Legislation and Modern Requirements," by Mr. Norton H. Humphrys, which appeared in the "JOURNAL" for the 19th of December. It will be difficult to avoid repeating some of the statements appearing hitherto; but I will endeavour only to do so in emphasizing new points arising out of the article.

To one who has endeavoured to establish what one considers a more adequate and efficient system of official verification of gas-meters, such communications as those which have been appearing are exceedingly interesting, and tend to elucidate matters. It is, however, remarkable how very few appear to accept the spirit of the general provisions of the Sale of Gas Act, 1859, as applicable to the correctness and incorrectness of meters. Rather, it is taken that the sparse rules which must be observed by inspectors of gas-meters in testing meters under the provisions of the Act are the last word in official procedure, though certain it is that were it not for the rate per hour stipulated in the rules at which the percentage error of registration must be ascertained, no meter should be stamped which was capable of being made to register incorrectly by any means practically prevented in good meters. Meters registering correctly at certain rates of working may be found to register seriously incorrectly at other rates; and there are good meters which register correctly at widely different rates of working.

I am strongly of opinion that it is a most important duty of inspectors of gas-meters to observe first the limit—not being less than half a cubic foot per hour—at which meters do or do not work, as evidenced by their indices. The Sale of Gas Act does not prevent this being carried out; rather is the spirit of the Act inclined to the greater accuracy, although it is not ensured, owing to the provision of an alternative choice of rate. With some, it is questionable if the rule is interpreted to amount to more than an external soundness test, even supposing the more stringent rate was applied to ascertain that the meter worked under the conditions prescribed. This I take to be the main objection raised from the point of view of the seller of gas. A meter may be found to work and register by means of one of its measuring sections, and may therefore be deemed sound; but were it to be tested throughout all its sections, it might be found that the meter ceased to work, and must therefore be deemed unsound. So very much depends upon whether the spirit of the Act as to soundness of meters as a whole is regarded, or whether only the letter of the rule as to their having been found to work under the conditions prescribed is regarded as conclusive, which, of course, means so very much difference between profit and loss in administering the Act.

The enormous number of meters which are passed through some stamping offices stand as evidence that the more stringent test is not applied. To the practical mind, it is impossible for them to do so, without special plant and ample assistance to even test meters at the alternative rate of working for soundness testing, and even only to the extent of ascertaining that they will work on the section which happens to be directly open to the inlet. As a matter of fact, one of the largest administering authorities have declared it would seriously impede the work of their officers were they to apply the test with all the meters which are submitted to them. I believe I am in a position to show that adequate plant and ample assistance need not necessarily be a burden on the district fund. Whether this be acceptable or not, it must be very evident that the half cubic foot rate, when applied to all the parts of all meters, is a most stringent test in practice.

With reference to it not being specifically clear why maximum and

minimum rates are prescribed, and why gas is specifically laid down for soundness tests, while gas or air may be used for ascertaining the percentage of error of registration, the more reasonable interpretation of the spirit of the law would be that the soundness test could never have been intended to apply to only a section of a meter, and that gas is practically essential to locate external leaks. This being accepted, there remains very little doubt about the impracticability of applying the more stringent test to all the sections of all meters by the means usually employed; therefore a practical alternative rate has appeared necessary for meters of large capacity per revolution of the measuring sections. It cannot, however, be interpreted to mean that the more stringent test could not be applied if desired, or if some more practicable means of doing so were discovered. Whether there is a scientific reason for stipulating gas for soundness testing is not of much concern to inspectors of meters. There can be very little doubt that it was, and is still, used for the torching of meters externally, notwithstanding the more precautionary alternative of painting surfaces with soapy water.

So far these matters appear to be the business of inspectors of gas-meters and administering authorities rather than the want of more stringent legislation. Some authorities will not sacrifice efficiency to cost; while others are not inclined to incur avoidable cost with the verification and stamping of meters for other authorities who have not seen fit to adopt the Sale of Gas Act. Nevertheless, it remains the liability of the inspectors who are appointed not to stamp any meters before they shall have duly tested them, and found them to be correct. Uniformity of practice does not appear probable under the present arrangements.

I agree that the conditions of modern supply demand that the pressure should be increased with soundness testing, as being more necessary for external soundness. Whether this would act more stringently as an internal soundness test is a matter of opinion, seeing that the whole interior would be held in a state of rest at small rates of working. Were the sections open to the atmosphere, with the force applied acting directly on the sections, it would be a different matter. Then, again, small external leaks even would not be long tolerated with meters in use. If the loss really is as great as that set forth by Mr. Humphrys, the gas unaccounted-for must surely be very much larger than sellers of gas declare. The only other deduction is that, while some buyers get very much more than they pay for, others must pay for very much more than they get, and that sellers of gas are truly but the nominal losers. It is known that dry meters usually get faster after being for a time in use, so long as they remain sound; so one must suppose that the gain by the fast meters must very largely compensate the sellers for the losses on the meters which do not register all that passes through them. Therefore a more stringent law favouring the seller of gas would naturally require some corresponding consideration being enacted to protect the interests of the buyer of gas. What would appear most forcibly would be the need of periodical re-verification of meters. There is need of this in any case, seeing how severe the conditions of modern supply are admitted to be on the life of meters and their continued accuracy.

With regard to the pressure at which meters are officially tested for percentage of error of registration, I am of opinion that the conditions should approach more nearly those at which they are used. Even then repeated tests would show different results with some meters. In my opinion, accuracy of registration would not be so much ensured by tests at higher pressures as by tests at different rates of working. Meters would pass as correct at certain rates; while with the same meters, if tested at (say) nominal rate and double rate, the difference of error may be found to vary more than the present limit for error several times over. My experience has been that meters which register correctly under the conditions here suggested are not likely to register incorrectly at any speed to which they could be reasonably expected to work. Of course, I do not here include the exceptional conditions of high-pressure supply, which special meters have been designed to withstand, externally. The prescribed pressure of 5-10ths of an inch of water does ensure some good qualities in meters—such as smoothness of working, steadiness of lights, and large passage, which are all essential qualities in all good meters.

From the general indictment, one is inclined to doubt that manufacturers of gas-meters have risen to the occasion, and produced satisfactory meters suitable to all requirements; or that they, with sellers of gas, do not need the terrors of legal enactments with the regulation of measures used in the selling of gas. No; manufacturers are no doubt quite prepared to supply what buyers of meters demand of them at a fair price, and subject to what stamping offices are prepared to sanction where officially stamped meters are required. One thing Mr. Humphrys' article does clearly show—that never was there more need of meters which have been adequately verified than at the present time. It does certainly appear reasonable to presume that, if an inspector's certificate is worth anything at all, it might be made binding on all parties. Experience has shown it as not desirable under present conditions. The desirability of questioning an inspector's decision is not unknown, as the evidence given before the Standards Commission of 1870 (Fourth Report, p. 308) will show. So long as inefficient verification, from want of Board of Trade control, prevails, so long does the right to appeal against inefficient practices appear to be necessary.

It is doubtful if all inspectors of gas-meters and sellers of gas have fully realized the relation of the Gas-Works Clauses Act, 1847, as amended by the Act of 1871, to the Sale of Gas Acts, 1859 and 1860, as regards the regulation of meters used in the selling of gas. At the time when the Sale of Gas Act became operative, its provisions superseded all others with regard to the appointment of inspectors and the stamping of gas-meters. The powers were not cumulative. [See section 23 of the Sale of Gas Act, 1859.] Further, between the years 1859 and 1871 the powers of the Sale of Gas Act were still in force, except only in certain cases where its powers had been set aside by Special Acts. The Standards Commission in 1870 considered that it had been proved to them that powers had been frequently granted by Parliament in Local and Personal Acts to corporations and persons, which powers were inconsistent with the general laws relating to the verification of gas-meters, which tend to prevent the establishment of a uniform and efficient system. But with the coming of the amended Gas-Works Clauses Act of 1871, very few of the powers of the Sale of Gas Act, 1859, as to the using only of duly verified and stamped meters, remained effective. By section 13 of the 1871 Act, sellers of gas were again permitted to approve their own meters in districts where the Sale of Gas Act had not been adopted—a state of affairs even worse than those the Standards Commission of 1870 endeavoured to improve. But, notwithstanding all the evident opposition to the regulation of gas-meters as provided by the Sale of Gas Act, 1859, which was made practically inoperative, it is a remarkable fact that very few meters are used in the selling of gas which have not been verified and stamped by an inspector of gas-meters under its provisions; the difference being that that which was imperative by law is now very largely permissive, excepting in such few districts as saw fit to adopt the Act. Some, as in the case of London, were compulsory; but others did so, no doubt, from commercial reasons, all of which are but a very small portion of the whole area of gas supply.

What I would here like to point out particularly is that the insidious injustice to which Mr. Humphrys has alluded is evidently within the power of a very large portion of the sellers of gas and the meter manufacturers themselves to prevent, and is not so much the outcome of existing legislation as may be the need of new legislation to ensure a better state of things. The patching-up of existing laws has appeared to have brought about a more complicated and ineffective situation. Short of a clean sweep, or a new consolidated law, section 13 of the Act of 1871 was not to be wondered at; for it had become illegal to use an unstamped meter, while the boroughs were powerless to adopt the Act from expiration of time, and the counties did not choose to do so. Under these circumstances, it must have been impossible, or rather found to be impracticable, to force the law as to the using only of stamped meters about the time (1870) when the limit of toleration did expire.

Were all the different interests to take counsel together with one common resolve—that a fair and equitable arrangement is essential to the common good of all concerned—then perhaps some good, practicable, and advantageous system of regulation might emanate therefrom. Surely it cannot be suggested that proper regulation is unnecessary. I am of opinion that little good will result until there is Board of Trade control, with an adequate and uniform system of verification and re-verification established.

Gas-Meter Testing Station, Nottingham, Dec. 26, 1911. FREDK. COE.

Popularizing the Use of Coke at Oldham.

Alderman H. Wilde, the Chairman of the Gas Committee of the Oldham Corporation, in calling attention to the large stock of coke now held by the Gas Department, said it was desirable that something should be done to popularize the use of this fuel in the borough for household purposes. To do this, the Corporation must, he argued, move a little out of the official rut. At present the quantity of coke sold for domestic purposes was comparatively small in response to post-card orders; and in his opinion this system was of no use for a wide and popular sale. Coke should be hawked round the town like coal, until people learned its advantages. It was true that large quantities were sold on contract, but at reduced rates. He would like to see a greater use of it by the inhabitants. Coke could be sold in Oldham from door to door at a moderate price in bags of 1 cwt. and ½ cwt., and the Corporation would in this way gain much more than by selling it at contract prices. The General Manager (Mr. Arthur Andrew) intimated that he would see what could be done in the way suggested by the Chairman. Meanwhile, the Corporation are, by advertisements in the local papers, directing the attention of householders to the excellence and economy of gas coke nuts for domestic fires and stoves; the price, delivered in bags, being 10d. per cwt.

York and the Smoke Question.

Councillor S. H. Davies, B.Sc., and Dr. E. M. Smith (the Medical Officer), who prepared a report on the smoke abatement problem for presentation to the York City Council, sum up their conclusions as follows: "We recommend that, as soon as the law permits, the present method of testing York gas for luminosity should be replaced by a test of its heating value, with a view to obtaining a clean, cheap gas of fairly high calorific value, which would give favourable results with incandescent mantles for lighting, while economical in use for cookers, gas-fires, and gas-engines. We hope the Gas Company would then be in a position to manufacture coal residues better suited for burning smokelessly in a household grate than their ordinary coke. We also advocate supplying electricity, both for heating and power purposes, at the lowest possible rates. The effect of lessening the smoke cloud of York would be felt in many ways—in an increase of vitality due to the added hours of sunshine and to diminished fog, in a remarkable reduction in household work and in the city's washing bill, in the improved growth of vegetation, and in the general amenities of our city life. The preservation of the fabric of the Minster and of our other priceless antiquities renders it especially important that we should do all in our power to reduce the evil. In this connection, we would especially direct the attention of the Committee to the necessity for stringent action with regard to the emission of black smoke and grit from railway locomotives."

Recent Electric Light Failures.—During the busiest shopping time of the Saturday evening before Christmas, the electric light on the Fitzwilliam Street side of Sheffield Moor suddenly failed, owing to a fault in a transformer. The trouble did not last more than fifteen minutes; but while the current was off, those shopkeepers who had no alternative method of lighting naturally suffered, along with the customers, much inconvenience. On the Thursday preceding Christmas, through an electrical mishap, part of the town of Dudley suffered considerable inconvenience. Several entertainments were interrupted; and one had to be abandoned.

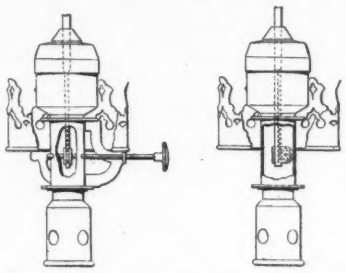
REGISTER OF PATENTS.

Incandescent Gas-Burners.

SHAW, P. E., of Leicester.

No. 27,146; Nov. 22, 1910.

The object of this invention is to provide means whereby the height of the mantle above an upright burner may be adjusted, so that, as the lower part has become damaged, the prop may be lowered in the burner, and thus bring the upper (good) part of the mantle into use.



Shaw's Adjuster for Upright Incandescent Burner Mantles.

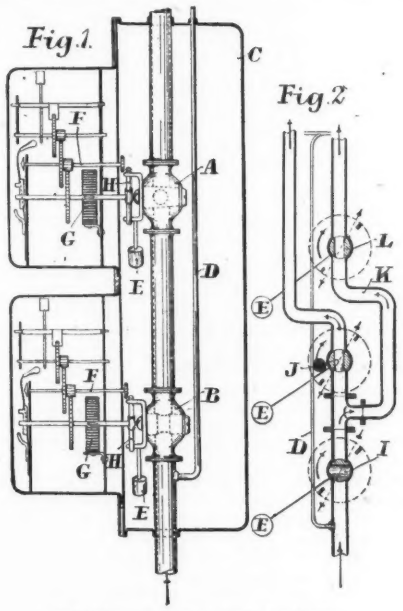
The prop or crutch is furnished at its lower end with rack teeth (as shown), to combine with a pinion fixed on a rod or spindle rotatable in the burner by means of a serrated disc at its outer end.

Controlling Gas-Cocks.

SCHEIDEMANN, B., of Berlin.

No. 29,125; Dec. 15, 1910.

This invention relates to apparatus for automatically operating the valves of gas-lamps at a predetermined time—being "an arrangement of weights or springs which are normally overcome by the force of the clockwork mechanism and which, when the clockwork mechanism is released therefrom, automatically returns the valves to their initial positions." For this purpose, a clutch-member is arranged on the shaft of the clockwork mechanism to engage with a second clutch-member connected to the gas-valve, and formed so as to be readily disconnected from it on the opening of the casing containing the clockwork. The clutch connected to the gas-valve is provided with a weight or spring to automatically turn the valve to its original position on the disengagement of the clutch.



Scheidemann's Gas-Cock Controller.

Fig. 1 is a side elevation (partly in section) of one form of the invention comprising two gas-valves for one single principal flame. Fig. 2 diagrammatically shows another form comprising three gas-valves used for controlling two principal flames.

The gas-valves A B are placed in the vertical gas-pipe in a fixed casing C. The bye-pass pipe D branches off from the main pipe in front of the valve B. On each spigot of the valves is a U-shaped clutch-member carrying a weight E. A cover or lid, attached by hinges to the casing C, carries two clockwork mechanisms which serve for actuating the two valves A B, and comprise regulating mechanism F, driving mechanism G, and toothed wheel gearing, releasing springs, and dials. On each axle of the driving mechanism is the clutch-member H, consisting of a rod which, when the cover of the casing C is closed, is in the plane of rotation of the clutch-member of the corresponding valve A or B.

Assuming that the principal flame at the burner attached to the main pipe is to be lit at 6 p.m. and extinguished at 10 p.m., the clockwork of the valve A will be so set that the driving mechanism G operates at 6 p.m. and rotates its axle and the rod H. The other clockwork of the valve B is set correspondingly to 10 p.m. After the two valves have been disconnected by opening the cover of the casing, the valve A is closed and the valve B is open (as shown). Now as soon as the clutch-member H of the valve A is rotated at 6 p.m. by the mechanism G, its rotatory motion is imparted to the clutch-member of the valve, and it is opened. Therefore, both valves are open, so that gas can flow to the principal burner, where it is ignited by the bye-pass flame burning at the end of the pipe D. As soon as the clockwork mechanism of the second valve B operates at 10 p.m. its clutch-member is rotated, and therefore the valve is closed, whereby the flame at the burner is extinguished.

The clutch-members of the two valves are held against the action of the weights E by the mechanisms of the two clocks in the position which they occupy at 10 p.m. A re-adjustment takes place the next day solely by the cover of the casing being opened, when, as soon as the clutch members come out of contact with each other, the upper ones swing automatically under the action of their weights, so that the valve A is closed again and the valve B opened. When the cover is closed, the coupling members move into the plane of rotation of the upper clutch members, in order to actuate the gas-valve again corresponding to the adjustment of the clocks at 6 or 10 p.m., or at any other desired time at which it is set.

In fig. 2, the invention is shown applied to two principal burners. Here the gas-valves I J are placed in the pipe leading to the principal burner; and between these the pipe K, leading to the second principal burner, branches off. A third gas-valve L is placed in the latter pipe. Each of these three valves is provided (as in fig. 1) with clockwork mechanism and clutch members, and also with a weight or spring. The bye-pass pipe D branches off in front of the bottom gas-valve I, and is used for both the principal burners.

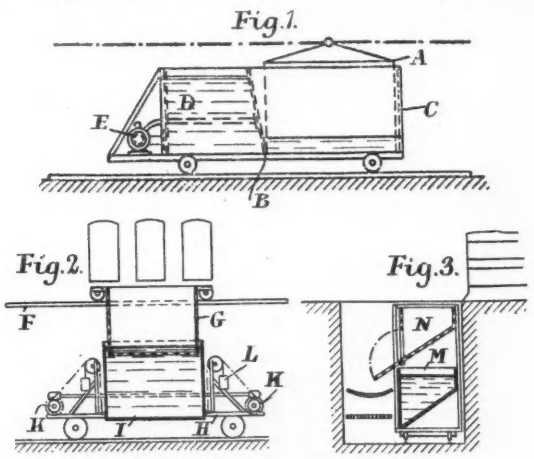
This form of apparatus operates as follows: It is assumed that, for the purpose of illuminating windows of stores, the groups of lamps connected to the two pipes are to be ignited simultaneously at 6 p.m., and that the one group of lamps is to be extinguished at 9 p.m. (when the store is closed) and the second group at midnight. For this purpose, the clockwork mechanism of the valve I is set to 6 p.m., that of the valve J to 9 p.m., and that of the valve L to midnight. The valve I is closed in its preparatory or normal position, and the other two valves are open (as shown). At 6 p.m. the valve I is opened, so that, as the other two valves are already open, the two groups of lamps can be ignited. At 9 p.m., the valve J is closed; and therefore the group of lamps connected to it are extinguished, and at midnight the valve L is closed and the group of lamps connected thereto are extinguished. The three valves may be reset as described with reference to fig. 1.

Quenching and Removing Coke.

BLEICHERT, M. A., of Leipzig-Gohlis, Germany.

No. 3150; Feb. 7, 1911.

The object of this invention is "to secure effective and gradual, but expeditious, quenching of coke-masses—more particularly large masses, such as have to be dealt with in connection with retort-ovens." The invention is in part based on the utilization of the quenching capacity of the steam generated, reinforced with water; and it consists, as regards the mode of operation, "in immersing the bottom layers of the coke in water and substantially maintaining the level of the water, relatively to the coke, during the evaporation consequent upon the immersion—the upper layers of coke being quenched by the steam generated."



Bleichert's Coke-Quenching Plant.

Fig. 1 is an elevation (partly in section) showing a quenching receptacle A with apertured walls adapted to be lowered into a water-tank B, movable on rails in front of the retort-ovens. The tank comprises a chamber C for the quenching receptacle, and a chamber D from which water can be furnished to the quenching receptacle as required by means of a pump E.

In the modifications shown in figs. 2 and 3, the tank is adapted to be raised and lowered. In fig. 2, the pendent coke receptacle G travels on a rail F in front of the ovens, parallel with, and above, the track of a trolley H carrying the tank I. The latter is vertically movable on the truck, and can be raised and lowered by means of collectively actuated winches K; the tank being balanced by weights L. By raising the tank so that it envelops the receptacle, the coke is gradually quenched from the bottom upwards. In fig. 3, the coke receptacle N and tank M are both in the same trolley; the tank being vertically

movable below the receptacle. This collective arrangement of the tank and coke receptacle is to economize space in regard to height.

The removal of the coke as quenched may be effected in various ways. In most cases, unless apparatus such as shown in fig. 3 is used, it is convenient to effect the removal of the coke receptacle from the tank at some place removed from the retort-ovens.

The coke quenched as described is said to have "a very small proportion of moisture, and produces little grit. There is no splashing of water from the tank, and the vapours have free exit after the quenching, so that they are not noxious to the operators."

Retort-Charging Apparatus.

BIRD, H., of Ryde, Isle of Wight, and SIMPLEX SCOOP SYNDICATE, LIMITED, of London Wall, E.C.

No. 29,174; Dec. 15, 1910.

This apparatus for charging gas-retorts is of the type in which a scoop divided longitudinally of its length is charged with coal and then inserted into the retort and opened, as described in patent No. 18,334 of 1908. The sides of the frame upon which the scoop is mounted are connected together within the scoop by cross members or brackets which are adapted to carry the bearings and links for opening and closing the scoop.

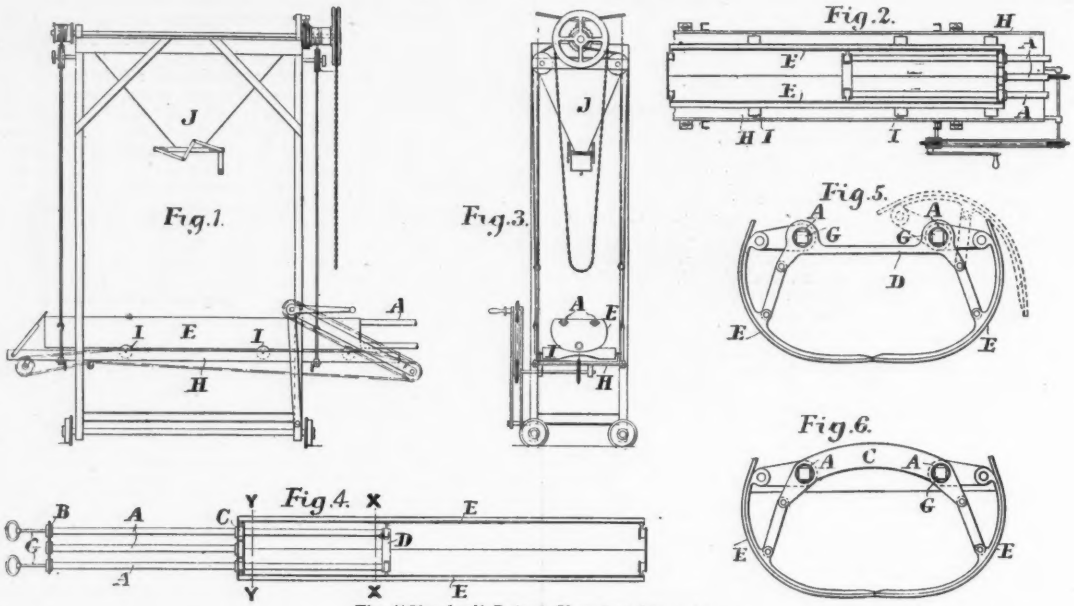
Fig. 1 is a side elevation of one form of the apparatus made with one scoop. Fig. 2 is a sectional plan. Fig. 3 is an end view. Fig. 4 is a plan of the scoop. Figs. 5 and 6 are sections of the scoop on the lines X and Y.

The scoop comprises a frame having tubular members A and cross members B C D and a body formed of sides E. The sides are pivoted to cranks mounted on rods G disposed within two of the tubular members A, and are connected to brackets on the cross members C and D by links. The ribs which support the sides of the scoop are provided with bosses for connecting them to the links and cranks. The frame of the scoop projects rearwardly of the body or sides, and carries the rods G, which are provided with handles for opening and closing the sides. The carriage upon which the scoop is mounted comprises a lift H, adapted to be raised and lowered between standards, and provided with runners I, which form a cradle for the scoop.

The means for raising and lowering the lift comprises a shaft mounted longitudinally of the carriage, with winding drums on the shaft, and a pulley and chain for rotating the shaft. Steel ropes from the lifts H pass over pulleys to the winding drum; and brakes, ratchets, and pawls are provided for holding the litts in any desired position. Where two scoops are mounted on one carriage, the apparatus may be duplicated; and the lifts are then so arranged that one is being raised while the other is being lowered. The scoops may be set to charge two retorts at the same time or different levels at the same time.

On the top of the carriage is mounted a hopper J and a shoot by which the scoops may be charged. The base of the hopper is provided with sliding doors for regulating the supply of coal which passes down the shoot—the sliding doors being mounted in a frame and adapted to slide over one another by lever-and-link motion.

[The appliance was described at the meeting last February of the Isle of Wight Gas Association, and was illustrated in the "JOURNAL" for March 7, p. 696.]



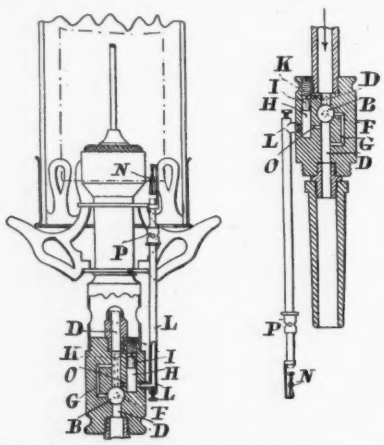
The "Simplex" Retort-Charging Apparatus.

Pneumatically Operating Gas-Valves for Lighting and Extinguishing Gas-Burners.

SACHSE, A. P., of Limbach, Germany.

No. 4688; Feb. 24, 1911.

The invention provides a pneumatic arrangement whereby single or series gas-burners can be lit and extinguished from a distance—the improvements consisting in the combination with an intervening body portion between the gas-pipe and the burner of two separate internal pistons operating within the body portion for the purpose of controlling the supply of gas to the main burner and to the pilot-jet.



Sachse's Pneumatically Controlled Gas-Burners.

The illustration shows a vertical section of an upright burner and an inverted burner with the pneumatic arrangement applied to them.

The body portion, which carries the gas-nozzle, has a counterbore B furnished with a movable piston for opening and closing the gas-supply passage D. From the outer closed end of the bore a small tube F leads away for use in producing either suction or pressure as may be required for opening or closing the gas supply. If there is suction in F, the piston moves so as to open the gas supply D; and the rear of the piston discharges through an auxiliary channel G leading from B to the upper end of the gas-passage D. At the side of the bore B there is a further bore H, also furnished with a loose piston; and a communicating passage K leads from the upper end of H into the front end of B in such a manner that the suction in the tube F produces simultaneously the outward movement of the first piston and the upward movement of the piston last named. A cross passage O, through the lower portion of H, leads one way into the gas-supply passage D and the other way into an external pipe L with the air supply P to drive ignitable gas mixture to an igniting pellet N in proximity to the burner-head.

The action is as follows: Through suction the burner-pipe D is opened, and the piston is lifted so that gas can pass in the pipe L to the pellet N and draw in the necessary air through P for producing incandescence. Within a few seconds, the gas issuing from the burner-head lights up. By reason of the rarefaction above the piston, it is kept up for a few seconds, but falls by its own weight as soon as equilibrium of pressure is re-established, and then closes the gas-passage to the tube L and extinguishes the pellet N. The main burner thus remains alone in action.

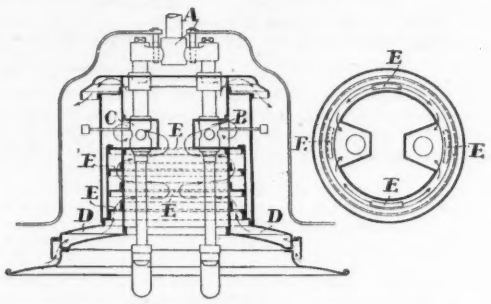
Incandescent Gas-Lamps.

EHRICH AND GRAETZ, of Berlin.

No. 5965; March 9, 1911. Date claimed under International Convention, March 18, 1910.

This invention relates to incandescent gas-lamps in which the hot-gas chimney is arranged centrally in the lamp casing and surrounds the burner-tubes, and in which the air admitted to the mixing-chambers of the burners for mixture with the gas is caused to make a circuitous path and be preheated in an annular chamber surrounding the chimney and heated thereby. The invention consists in the combination with such a lamp of a plurality of substantially horizontal partitions having alternately arranged openings or perforations and heated by the hot

gases in the chimney, so that the air is directed in a zig-zag or circuitous path in the preheating chamber and at the same time is heated by contact with the horizontal partitions.



Ehrich and Graetz's Inverted Incandescent Gas-Lamp.

The gas is supplied to the burners by way of a distributing body A; the gas in its course mixing with the necessary air drawn in to the burner-tubes through the mixing-chambers B C. The burners are arranged within the lamp chimney, and the mixing-chambers are in pockets or recesses in the chimney, whereby the admission of the products of combustion from the burners to the mixing-chambers is prevented. Surrounding the chimney are cylindrical sheet-metal casings, which form annular chambers for the preheating of the air admitted to the mixing-chambers. The air is admitted to the annular chamber intermediate the chimney and casing by way of an annular chamber D intermediate the lamp reflector and a cap above it; the chamber D being in communication with the outer atmosphere.

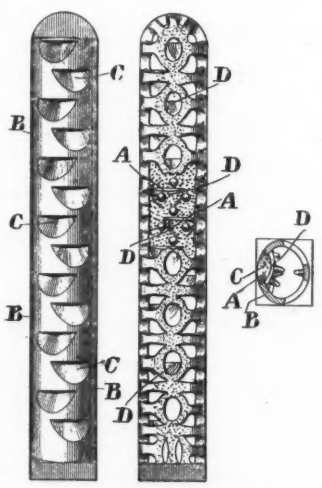
In the annular chamber between the chimney and casing are arranged a plurality of plates in direct contact with the hot-lamp chimney, and provided with openings E, which permit of the passage of the air through the compartments formed between the chimney and the outer casing. These openings are, however, so placed that the air cannot pass directly upwardly, but is compelled first of all to take a circuitous course through one compartment before obtaining access to the next upper compartment. In this manner, the air is caused to take a partially circuitous, and at the same time zig-zag, course through the air preheating chamber, as indicated by the arrows, and is thus caused to be in contact with the surfaces heated by the hot gases from the lamp for a considerable length of time before passing through the central aperture in the cover-plate of the air preheating chamber. The air then passes to the chamber which partially surrounds the air preheating chamber, and thence is admitted to the mixing-chambers B C.

Fuel for Gas-Fires.

GLOVER, THOMAS, of Edmonton.

No. 8135; March 31, 1911.

This invention relates to fuel for gas-fires made in lengths of tubular form with open ends and an open-worked front; the back being of a solid character and provided with tips projecting inside the tube, so that the back portion is so made that air can be admitted to support combustion of the flame inside the tubular lengths of fuel—entering at an angle upwards.



Glover's Fuel for Gas-Fires.

The inventor (as shown) forms holes or recesses A in the back B of the tubular fuel; the material C of the back, just below each hole, being pushed inwards so as to project inside the tube and form lips D standing out from the back. The outer wall or surface of the pressed-in part C is at an angle and smooth, or somewhat smooth, so that the uprising flame in the tube will draw in the air from the back and through the holes in an upward direction at an angle of about 45° to the flame. These holes and angled walls may be in vertical lines or otherwise arranged in any desired manner; and "the projecting lips are rendered incandescent by the flame, which greatly enhances the effect of the fire."

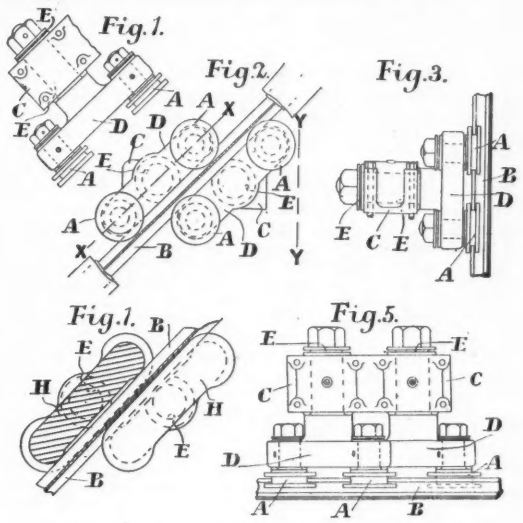
Supporting Means for Spirally-Guided Gasholders.

BEARD, G. F. H., of Crumpsall, and SCOTT, J. W., of Heaton Chapel, near Manchester.

No. 20,568; Sept. 18, 1911.

This invention has for its object so to provide supporting means for spirally-guided gasholders as to enable the number of guides or rails to be reduced.

This is to be accomplished by increasing the number of points of contact, or extending the contact, between a guide or rail and the supporting means adjacent to it—"thus distributing the strain, instead of, as heretofore, for the most part, allowing the strain to be resisted, on one side of the rail, at a single point, or small area of contact."



Beard and Scott's Spiral Guides for Gasholders.

Fig. 1 shows a pair of rollers, and a portion of a carriage, taken at right angles to the line X in fig. 2, which is an elevation (partly in section) showing the application of a pair of rollers to each side of a spiral rail. Fig. 3 is a side elevation taken at right angles to the line Y of fig. 2. Fig. 4 is a sectional elevation showing one application of contact or supporting blocks to the rail. Fig. 5 is a plan of fig. 2.

A are the rollers, which, in the present examples, are two in number on each side of the rail B, and C is the carriage—any number of such carriages required are attached to the tank side or to the holder or lifts. In figs. 1, 2, 3, and 5, a carriage connection or yoke-like portion D is shown provided with a shaft E, which is capable of turning about its axis within the carriage C, should the irregularity of the rail B or the setting of the rollers or mounts allow of, or necessitate, such movement; and in this manner both rollers on one side of the rail may tend to maintain simultaneous contact with it. The pressure due to the weight of the holder, and other causes, being thus resisted at more than one point of the rail, it is obvious that the distributed load will not affect the rail so detrimentally as when concentrated upon the single point referred to; and therefore a less number of rails may be employed with the former arrangement than with the latter.

In fig. 4, supporting or guide-blocks H are provided in lieu of rollers, each of which blocks is capable of a turning movement about an axis, similarly to the cases illustrated in figs. 1, 2, 3, and 5. The blocks have divided points of contact; but a continuous surface from end to end, or thereabouts, may in some cases be used. The surface of the blocks may also be provided with anti-friction means.

Opposition to the Fylde Water Board's Bill.—The Town Clerk of Preston has been authorized by the Water Committee of the Corporation not to assent to the proposed application to Parliament on the part of the Fylde Water Board for powers to impound the head waters of the River Hodder, and construct reservoirs, aqueducts, and other works. This action was decided upon by the Water Committee with a view to safeguarding the interests of the Corporation. The Clitheroe Rural District Council have also, on the advice of their Clerk, decided to oppose the Bill, though this authority's district is only slightly affected by the scheme. Strong opposition is also to be offered by the local councils having territory bordering on the upper reaches of the River Hodder and its tributaries. The proposed new works of the Board are estimated to cost £1,858,650.

Sidmouth Public Lighting Contract.—At a recent meeting of the Sidmouth Urban District Council, the Finance Committee reported that the Sidmouth Gas Company had drawn attention to the fact that their contract for public lighting would expire on the 1st of July next, and had expressed the opinion that, as the Council were promoting a Bill for the purchase of the works, it was not worth while to enter into a fresh agreement. They said the Company proposed to continue the public lighting of the town on the same terms as specified in the agreement, except that the price should be definitely fixed at 3s. 11d. per 1000 cubic feet, instead of at 3d. less than the current net price charged to private consumers, as hitherto. The Committee recommended the Council to reply that, in view of the proposed purchase of the works by the Council, they thought it inadvisable that the agreement should be varied in any particular, and that in any case the Council were entitled to reasonable notice—say six months—before any alteration should take effect. The report was adopted.

MISCELLANEOUS NEWS.

ELECTRIC LIGHTING AT BARKING.

An Unprofitable Undertaking.

At the Public Offices, Barking, Mr. T. C. EKIN, M.Inst.C.E., one of the Inspectors of the Local Government Board, was engaged for two days last week in inquiring into an application made by the Barking Urban District Council for sanction to the raising of £11,000 for the purposes of the electricity undertaking. Considerable interest was shown in the inquiry, and there was a large attendance. A number of working men were present, and one of them stated that they represented one-third of the workmen of Barking. They were all gas workers, and were opposed to the Council's application.

Among the opponents of the application were the Barking Traders' Association and the Gaslight and Coke Company, for whom Mr. E. J. NALDRETT and Mr. J. N. REESON (the Engineer-in-Charge at Beckton) appeared.

Mr. H. HARGREAVES, the Clerk to the Council, stated that the total indebtedness of the Council was £283,280; and their borrowing power was £310,000. Outstanding loans in connection with the electric light undertaking amounted to £43,338. With regard to the present application, the Council asked for the repayment of the loan to be spread over as long a period as possible—forty years for the buildings and twenty years for the Diesel engine. The overdraft on capital account in connection with electric lighting was £548, which had been spent on mains and services in anticipation of the sanction of the loan. The buildings had not been commenced. The Council's total overdrafts amounted to £1658; but they had £3304 in hand at the bank on various accounts. Having given details of the proposed loan, Mr. Hargreaves said he would like to draw the Inspector's attention to the fact that the increase in the units generated and sold was continuous, and that the average cost of production per unit sold had been reduced year by year to 1·186d. for the last completed year. As to the financial result of the undertaking, it had been almost entirely a losing concern since its establishment. He proceeded to explain the causes of this, and said if the Diesel engine was installed, the economy in fuel alone would amount to more than £1000 per annum.

Mr. *H. L. Howard*, the Electrical Engineer to the Council, stated that the number of units generated during the last financial year was 1,538,592, made up as follows: Private lighting, 256,044; public lighting, 307,802; power, 657,935; traction, 298,811. The number of consumers on March 31 was 1021. Last year the loss of £1037 was the highest they had experienced.

The INSPECTOR: Rather a sad record. The thing is, what can be done?

The CLERK: I hope to show that by these extensions we shall be able to turn the corner and do better.

The INSPECTOR: Can you tell me why it is necessary to keep your prices down?

Witness: I am afraid if we did not keep our prices down, with the keen competition of the present day, we should soon have to go out of the business.

The INSPECTOR; I quite understand that you must keep things down as low as you can; but with a loss of £1037 last year—and you are going to continue—I do not see how you are going to turn yourselves round.

Mr. NALDRETT: Is it not practicable to put a higher charge on what you are supplying to consumers?

Witness: Not at the moment, because of the opposition we have.

The INSPECTOR: But you have no opposition from other electricity works?

Witness: No; but we have it from the gas-works.

In reply to other questions, witness said that from 1899 to 1910-11 the loss on the electricity works was something like £6141; and this amount had been charged to the district rate.

Mr. NALDRETT: What guarantee can you give that this loss will not continue?

Witness: I should be very sorry to give any guarantee. Certainly it is obvious that if we can reduce our working expenses by a certain sum we shall be that amount better off.

Could not the Gas Company light the streets cheaper than you are doing?—I could not say; but if the street lighting was taken away, it would be a loss to us.

The INSPECTOR: But you lose on every unit you generate. Do you say it is a source of profit?

Witness: Oh, yes. Quite.

Mr. NALDRETT: Is it not a fact that your consumption went down 11,000 units last month as compared with the previous month?

Witness: Not last month; it might have been for the corresponding month of last year.

In reply to Mr. REESON, witness said the loss on the undertaking during the past two years was due to the high cost of generation, and not to the fact that they were supplying electricity for power at 1d. per unit.

Mr. W. A. THOMAS (representing the Barking Ratepayers' Association) asked witness if he knew that the lighting of the town, both public and private, had been very inefficient?

Witness: As far as private consumers are concerned, I have had no complaints; but with regard to the public lighting, there has been complaint, because I have had some difficulty with the mains, which has now been remedied.

Mr. NALDRETT said the Barking Traders' Association included a considerable number of large ratepayers and the principal traders of the town. He handed in a list of the members, 75 in number, and said the rateable value of the properties they occupied was between £9000 and £10,000. This, however, did not represent the whole of the opposition. He had in his hand a resolution passed at a meeting composed of manufacturers and traders, representing a rateable value of £63,910, strongly opposing the Council's application. In addition to this, there was a very general feeling against it among the inhabitants of the town; in fact, though he had been engaged in many local inquiries, he did not know that he had ever come across so much opposition as existed in the present case. He thought this was accounted for by the fact that the Local Authority were proposing to borrow more money in order to bolster up an undertaking which was a very bad example of municipal trading. It was admitted on all hands that the undertaking was unprofitable, and that the last year's working had been disastrous. As time went on, matters had become worse; and they were face to face with the fact that the loss on the undertaking for 1910-11 was greater than it had been in any preceding year. The cost of producing electricity was more than 2d. per unit; but the average price realized was only 1·8d. per unit. No undertaking could possibly be conducted as a commercial venture under such circumstances; and this undertaking could not go on unless the losses could be made up out of the rates. The basis of the opposition was that the undertaking was already run at a loss; it was already burdened by heavy loans; there was no real demand for a further supply of electricity; the public lighting could be carried out at less cost by gas; and the proposal would put an unnecessary burden on the rates. Evidence would be given that the streets could be lighted by gas at less expense than that incurred by the Council; the light would be 100 per cent. better; and the cost would be 25 per cent. less.

Mr. *Lloyd Jones*, a consulting engineer, gave it as his opinion that to instal a Diesel engine and discard the existing plant was very doubtful policy. He considered increased plant was not necessary.

Mr. *F. W. Goodenough*, Controller of the Sales Department of the Gaslight and Coke Company, said that by substituting gas for electricity the public lighting of the town could be improved upon to the extent of 100 per cent.—representing a saving of about £700 a year, being 25 per cent. of the present cost.

Mr. NALDRETT: That could be done, taking into account the cost of conversions?

Witness: Yes; if it were spread over ten years.

In reply to Mr. HARGREAVES, witness said that on the 1st of January [yesterday] the Barking Gas Company would be taken over by the Gaslight and Coke Company; and from that date the latter Company would be direct competitors with the electricity undertaking of the Council.

Mr. *J. B. Calnan*, of the firm of Messrs. Page, Calnan, and Co., submitted that the present scheme was not necessary, and that the existing plant was capable of providing for present requirements.

In reply to Mr. HARGREAVES, witness said that of the £63,910 rateable value represented by the manufacturers and traders who passed a resolution at his firm's office on the 15th of December, £56,000 represented the rateable value of the Beckton Gas-Works.

Mr. *A. W. Smith* stated that the general tendency of manufacturers in the town was to instal their own power. In his opinion, the present plant was quite sufficient to meet the demand, which he believed would diminish rather than increase.

Mr. *R. Willett* said he was a Past-President of the Traders' Association. It was his view that the Council were quite unwarranted in asking for the loan, as the undertaking had been a burden on the ratepayers for a number of yesrs. Not only was there a loss on it, but the tramways were also a great burden.

Mr. HARGREAVES: If we are going to have all this competition from the Gas Company in the New Year, does it not seem to you to be necessary that we should be in a position to generate electricity more cheaply than we do now, so as to compete with them?

Witness: Not if you are going to spend all this money to produce that.

But if the estimates put forward are carried out, we are going to generate electricity at a much less figure?—I do not agree with the estimates at all.

Have you any practical experience of this character?—Only the experience that estimates of this kind during the last eleven or twelve years have all been wrong.

The INSPECTOR: I should like a direct answer to the question which was put to you just now. Do you not think it would perhaps be a good thing to the town, and a good thing to the undertaking, to put in plant which would generate electricity at less cost than at present, in view of the possible competition?

Witness: I cannot say myself that, with the proposition now before the Local Government Board, there is any possibility of effecting this saving.

Mr. J. N. REESON said it was quite true that his Company would be competitors with the Council in the lighting of the town. At the beginning of the New Year, they would acquire the undertaking of the Barking Company, and then the price of gas would be reduced from 2s. 11d to 2s. 9d. per 1000 cubic feet. The price would be further reduced in 1913 to that which was then being charged by the Company throughout the whole district. Their present price was 2s. 7d.; and it was promised that it would be reduced in 1912 to 2s. 6d., and very likely in 1913 it would be lower. He contended that these reductions were bound to give an impetus to the use of gas, both for illuminating purposes and for power. The actual rates paid to Barking by his Company were £25,000 a year. They employed between 3000 and 4000 men, some 1200 of whom lived in Barking. For this expenditure of £25,000, the Company did not receive any benefits from the District Council. He appealed with confidence to the Local Government Board to reject the application.

Other speakers having offered remarks in opposition to the application,

Mr. HARGREAVES, replying on the whole case, said the scheme had been put forward as an honest attempt to make the electricity undertaking pay its way.

The inquiry then closed.

With regard to the Provisional Order sought by the Ribble Fishery Board, the Water Committee of the Preston Corporation have instructed the Town Clerk to write to the Board of Agriculture objecting to the inclusion of the water undertaking within the area of the proposed Order.

HAMPSTEAD PUBLIC LIGHTING SCANDAL.

A Sample Protest from the Ratepayers.

The Hampstead papers are columned with the surprise and indignation of the ratepayers over what is termed the electric "scandal" and "fiasco" in connection with the £10,000 excess expenditure on the work of converting the public lamps from gas to electricity. The members of the Committees concerned in the matter are not escaping censure; and, though over £25,000 has been spent upon the conversion, there are complaints as to the want of success of the lighting. The following is a letter, signed by a ratepayer (Mr. Frank G. Howard), published in the "Hampstead Advertiser:"

"In reference to the report upon the extraordinary state of affairs resulting from the conversion of the street lamps from gas to incandescent electric lamps, I venture to suggest that the ratepayers are entitled to further information from the Borough Council. That such an excess of expenditure as £9000 over and above an estimate of £15,000 could occur, reflects very little credit upon the Council, and still less upon the 'Lighting *Business* Sub-Committee.' I should like to ask what are the duties of a 'Business' Committee if such things can occur? It seems the work was commenced in July last year [1910], and that it was only in October of this year [1911] that the Business Committee discovered that £9000 more than the estimate had been spent. Did this Committee, presumably composed of business men, examine the accounts from time to time, or have frequent reports furnished regarding the progress and cost of the work in hand? I tremble to think what might happen to a private business firm conducting their affairs on such lines.

"The original estimate for converting the gas-lamps to electric light was clearly more than 50 per cent. too low. Are we to understand that the estimated cost of maintaining them is also 50 per cent. too low, and that, instead of a saving to the ratepayers over the cost of gas, there is to be a heavy yearly loss? Perhaps the Business Committee will be able to inform us about this when they have had time to go into it—say, next year. The whole trouble seems really to have arisen from the Electric Lighting Committee attempting to *underbid the tender of the Gas Company* when they offered to light the borough for a certain annual charge. Naturally, the Committee desired to go one better, both in first outlay and yearly upkeep. Having the Gas Company's tender before them, they under-estimated in their anxiety to keep the lighting in their own hands, without fully understanding the business.

"I more than regret that the Chief Electrical Engineer and his Assistant should have to suffer such heavy punishment as to lose their posts. What of the Business Committee? Is it not equally to blame?

"I think that it is generally agreed throughout the borough that *the present lighting is not a success*. The pressure varies very considerably; and the light is usually very bad on Saturday and Sunday evenings. Cannot this be remedied?"

This correspondent appears to have hit the right nails on their heads. His letter bears out, from the local standpoint, the criticisms passed upon this matter in our last two issues.

Several other letters have been published in the local papers since the foregoing appeared. One of them is by Mr. A. Hastings White. In it he says: "Another thing in the present scandal is also certain, and yet it has hardly been mentioned, so far as I have seen. I mean the fact that the incandescent electric lamps afford only about half the illumination of the old incandescent gas-lamps. That is a reasonable scandal by itself; but no one seems to mind particularly. A strange kind of 'improvement' in street lighting, to substitute a dim light for a bright light, and one which you require to be a burglar to appreciate properly. Now we have got it, and have also had the pleasure of having it foisted on us under false representations. As usual, we shall 'make the best of it,' which is the conventional formula for persisting in any policy which was mistaken from the outset. This sort of thing is part of the price that has to be paid for representative government, and which we shall always have to pay until we devise something better, if there be anything better. The only consolation for us is that, on the whole, the machinery works better in the borough of Hampstead than in many another borough that could be mentioned."

Another correspondent—Mr. J. T. Dyter—in the course of his letter, said: "Surely the ratepayers are entitled to know what further loss they may expect in the consumption of electric current for street lighting as against incandescent gas; also the exact financial position of this great undertaking—whether it is solvent or not. In fact, we must get to know the history of this undertaking from top to bottom; and surely, if those gentlemen who form this Business Sub-Committee are free from blame, they will only be too pleased to put their services at the disposal of the ratepayers, and give all possible information at their disposal."

A member of the Council expressed himself as follows: "The discussion which took place *in camerâ* related solely to the conduct of two of the chief officials, and in no way related to the question of the £10,000 excess expenditure. That question will be discussed presently, and in public, as soon as the Committee now inquiring into the subject publishes its report. The Finance Committee's recommendations dealt only with the question of how the money which has been expended should be borne; and it was resolved that the same should be borne by the reserve fund. This resolution was, of course, somewhat formal, and mainly to satisfy the Local Government Auditor. The report which was discussed in private is now public property, and your correspondents will, by carefully reading that report, find their questions fully answered."

Reduction in Price at Elland.—The Elland-cum-Greetland Gas Company have decided to make a reduction in the price of gas to the ordinary consumers of 2d. per 1000 cubic feet, and to prepayment consumers of 2½d. per 1000 cubic feet. This reduction will make the price of gas to ordinary consumers 2s. 4d. per 1000 cubic feet; and for power and singeing purposes, 1s. 10d. and 1s. 7d., according to consumption.

SOUTH METROPOLITAN COMPANY & CO-PARTNERSHIP.

The Past Year's Work.

The current number of the "Co-Partnership Journal" of the South Metropolitan Gas Company opens with an article by the Chairman (Mr. Charles Carpenter), in which he reviews the work of the past year in connection with the co-partnership system in operation in the Company. In the course of it, he makes the following remarks.

We have every reason to be satisfied with the evidence the last twelve months' working has afforded of the strengthening of that feeling of unity which actuates the relationship existing between the South Metropolitan Company and its employees. As a result of meetings held at our various works and depôts, on the initiation of the workmen's section of the Co-Partnership Committee, a deputation from its members was for many weeks engaged in an energetic endeavour to convince Parliament and the Government of the desirability of exempting the employees of the Company from the provisions of the National Insurance Bill. They failed in their efforts; but their work brought out the remarkable fact that a Bill containing all the latest ideas of one of the most modernist Governments of modern times offered less favourable conditions than were possible under the regulations of the Company, which has had a sick fund established over seventy years.

In connection with this, I cannot refrain from protesting against the dishonourable suggestion that our fund is financially unsound. There can be no doubt whatever that it is as solvent as the Company itself; and I do not think co-partners would require any greater security than that. The members of the Sub-Committee must have had some interesting opportunities for comparing the way the business of the country is managed with that of a gas company; and it is not likely that the latter suffered by the comparison. Success in both instances must largely depend upon the ability as well as the earnestness with which the people in the one case and the workers in the other associate themselves with the affairs of the organization, national or industrial, in which their future happiness is bound up.

Circumstances during last summer and autumn brought me into close touch with two important sections of our employees—those engaged in the carbonizing department and those connected with the outdoor or district; and it was pleasing to note how strong was the feeling of good-fellowship which prevailed, and how intelligent the interest taken in two branches of our business differing so much as gas manufacture and its distribution.

It is often said that too little of the capital of this country is held by the working classes; and I entirely agree with the truth of the statement—indeed, the need for its extension lies, as Lord Grey and many others have pointed out to you, at the very root of co-partnership. You have the opportunity of helping to correct this deficiency in two ways—by your example and its lessons. The Company's co-partners hold upwards of £310,000 of stock, on which a dividend of practically 5½ per cent. per annum is paid. This figure, however, large though it be, is by no means the limit to what might be held; and a large increase in capital holding would come about if greater endeavours were made to supplement in savings, by ever so small amounts, the bonus which is credited yearly. Moreover, the greater the magnitude of the workers' holding in our undertaking, the greater the force with which these principles of co-partnership would appeal to others. What a fine thing it would be if these could be extended to the coal-mining industry? We often hear said of it: "The men are working badly and irregularly;" and this is given as the reason for higher prices and uncertain delivery. But all the country wants cheap fuel; and the expenses of working could certainly be reduced, as they have been in our case, if those engaged in the coal industry were interested in its profits, not upon the fictitious basis of high selling prices, but as the result of low productive costs. The greater our co-partners' capital holding, the more certain will be the voice in which they point to their example for others to follow; and this duty is one they owe not only to themselves, but to their fellow-workers in this Motherland of Great Britain, that they may share the blessing and reap the benefits they are in enjoyment of themselves.

Reduced Price of Gas in Birkdale.—With the commencement of the present year, gas consumers in Birkdale will be supplied with gas at the same price as that charged in the borough of Southport—viz., 2s. 8d. per 1000 cubic feet—instead of 3s. 2d. as formerly. The explanation for this concession of 6d. per 1000 cubic feet is as follows: In the ordinary course of events, Birkdale would have been entitled, on March 31 next, to a rebate of between £800 and £900 from Southport. But because of the amalgamation of Birkdale with the borough, this amount could not be paid by the latter. Therefore, during the negotiations in London over the incorporation, it was agreed, as a fair set-off against the non-payment of this rebate, to reduce the price of gas in Birkdale from the New Year.

Wages at the Rochdale Corporation Gas-Works.—An application made by the Gas-Workers and General Labourers' Union for an advance in wages to men in both the Gas and Electricity Departments was considered further at the last meeting of the Rochdale Corporation Gas and Electricity Committee. It was reported that the Sub-Committee appointed to deal with the matter had met a deputation consisting of the local branch secretary and two others. An advance of 6d. per week was asked for on behalf of the men; it being argued that the amount applied for was paid in connection with the gas and electricity undertakings in a number of places, the names of which were given. Subsequently the Sub-Committee obtained particulars of the wages paid to similar classes of workmen in about forty towns comparing with Rochdale, and from these returns it appeared that the Rochdale wages were equal to those earned by men in the employ of the majority of the corporations quoted. On the recommendation of the Sub-Committee, it was decided that the wages of the lamplighters should be advanced from 25s. 4d. to 26s. per week. The Sub-Committee did not recommend increases in the other cases; and this decision was confirmed by the full Committee.

CANNOCK DISTRICT COUNCIL AND THE GAS-WORKS.

Opposition to the Proposed Purchase.

Among the notices of intended applications to Parliament next session which appeared in the "JOURNAL" a few weeks ago was one by the Cannock Urban District Council, who desire authority to acquire the undertaking of the Cannock, Hednesford, and District Gas Company, and supply gas in an enlarged area. The proposal, judging from what has lately appeared in the local paper, is meeting with considerable opposition. A number of householders and ratepayers have held meetings to discuss the matter; and Mr. George Helps, of Nuneaton, has been called in to advise them. At a meeting of parochial electors on the 12th ult., the following resolution was passed: "That, in the opinion of this meeting of parochial electors of the Urban District of Cannock, the terms suggested or agreed between the Cannock and Hednesford District Gas Company, Limited, and the Cannock Urban District Council for purchasing the gas undertaking are excessive, and that the Urban District Council be requested not to proceed with their proposed Bill for the purpose of effecting such purchase." This resolution came before the Council at a special meeting on the 20th ult., in a report submitted by the General Purposes Committee, who, on the preceding day, had instructed the Clerk (Mr. C. A. Loxton) to reply to the sender of it. It is reported that Mr. Helps is adverse to the purchase, on account of the condition of the works and the distributing plant. Mr. Charles Hunt, who is advising the Council, considers the prospects of the undertaking, on the other hand, are "excellent—not to say brilliant—if only because of the exceptionally good field for increase of consumption." He says he has been concerned in a good many transfers of gas undertakings to local authorities, and he cannot recall one in which he could have so confidently recommended a purchase as in the present case. He is firmly convinced "that the ratepayers of Cannock would make a very great mistake in their own interests if they were to let this opportunity for purchase on fair and reasonable terms slip through their fingers." The proposed purchase price is £80,000. The statutory meeting is called for the 8th inst., when the result will show which expert's opinion has had most weight with the ratepayers.

OSWALDTWISTLE DISTRICT COUNCIL GAS UNDERTAKING

Inauguration of a Spiral-Guided Holder.

Since the appointment of Mr. J. H. Davies as Engineer, Manager, and Secretary of the gas undertaking of the Oswaldtwistle Urban District Council, the works have been practically reconstructed; the latest addition being a new gasholder to supersede one that was worn out. Its completion was made the occasion of a tour of inspection by members of the Council, and an interesting and pleasant ceremony.

Assembling near the new holder, Mr. A. Hargreaves, the former Chairman of the Gas Committee, invited Mrs. Pilkington, wife of Mr. James Pilkington, the Chairman of the Council and also of the Gas Committee, to perform the opening ceremony by turning the gas from the holder into the mains. Mrs. Pilkington having complied with the request, Mr. Davies presented her with an artistic pendant studded with pearls, as a memento of the occasion, and she was also accorded a vote of thanks. In responding on behalf of his wife, Mr. Pilkington expressed her sincere thanks for the unexpected and beautiful gift made to her. Continuing, he said the holder which the company had inspected was one of the spiral-guided type, of 170,000 cubic feet capacity, which took the place of a 60,000 cubic feet column-guided one installed in 1868-9. The new holder (constructed by Messrs. R. & J. Dempster) had three lifts; the total height being 65 feet. Before the installation of the new holder, the working storage was 285,000 cubic feet; but as the maximum day's consumption reached 414,000 cubic feet, the necessity for the increase would be understood. The storage capacity was now 480,000 cubic feet; thus leaving a fair margin for future growth of consumption. The cost of the holder was £1500.

After the opening ceremony, the company proceeded to the Commercial Hotel, Church, where they were entertained at dinner by the Chairman of the Council, who presided.

At the close of the repast, the loyal toast having been duly honoured, the Chairman of the Church District Council (Mr. John Pilkington) proposed "The Chairman of the Gas Committee." In responding, Mr. James Pilkington said that during his chairmanship he had had the hearty co-operation of every member of the Council; and he expressed the hope that the same good-fellowship would be extended to his successor when his term of office had expired.

Mr. T. W. Welton proposed "The Gas-Works Committee;" and, at the request of the Chairman, Mr. Hargreaves responded. He said, though he was not a believer in committees, one was necessary in connection with gas-works. At the same time, he thought when they had a good man as manager—a man with progressive ideas, and intent upon making the works a commercial success—they should give him all reasonable latitude. A committee missed its mark when it put an obstacle in the way of progress in what was purely a commercial undertaking. The Gas Department ought to be, and he was glad to say now was, a profit-making concern, in which the ratepayers were the shareholders and the gas committee the directors. Within the last few years there had been a decided change for the better. Reviewing the past seven years, he said the development had been phenomenal. In 1904, the make of gas was 44 millions; whereas last year it was 67 millions. In 1904, the price was 3s. 6½d. per 1000 cubic feet, and now it was 2s. 8½d.; so that the increase in the consumption had been attended with a reduction in price. This was clear evidence of what the guiding policy ought to be. What was to be the future policy? It should be to give the people increased facilities for the use of gas. There was a large field undeveloped. In Oswaldtwistle there were 3750 inhabited houses, and in nearly one-fourth of them gas was not employed. They should provide facilities for all householders to use gas. He also advocated making it easier for people to acquire gas-cookers. If this policy were pursued, instead of having a consumption of 67 millions, they would reach one of 100 millions ere long; and the present plant was capable of meeting the larger demand. If they could attain such a consumption, he believed it would be possible to make a much greater reduction in price than was even anticipated at the present time, and also provide a fair amount for the relief of rates.

The toast of "The Town and Trade of Oswaldtwistle" having been honoured, Mr. T. C. Usher proposed "The Gas Engineer," and congratulated Mr. Davies upon the efficient and economical manner in which he had controlled the Gas Department. He said Mr. Davies was evidently alive to the fact that the electric light was bound to come; and he was doing his best to produce gas cheaply in order to be able to compete with it. Mr. Davies, in response, said, as Mr. Hargreaves had remarked, there was a large undeveloped field in the town still untouched. The consumption of gas had increased from 44 to 67 million cubic feet; and for 1911 he believed they would reach 75 millions. They had on their books 3000 consumers; but there were only about 800 or 900 gas-cookers. They were advancing, but not quickly enough; and it depended upon the policy of the Gas Committee what advance there should be. He had urged them to instal gas-cookers free of cost in every house; being firmly convinced that it would be remunerative to the gas department besides being a great convenience to the public, and would tend to diminish the smoke nuisance. Mr. Davies quoted figures in support of his contention. He said the gas-works were a business concern, and the sooner the Committee adopted the principle of free cookers the better it would be for the gas consumers in general.

Among the remaining toasts was that of "The Contractors."

Reduction in Price.

At the last monthly meeting of the District Council, the Gas Committee submitted a recommendation that the price of gas be reduced, as and from April 1, 1912, and the following rates fixed: Persons using prepayment meters to pay 1d. for 32 cubic feet of gas, without discount; consumers of 250,000 cubic feet per month, 2s. 3d. per 1000 cubic feet, subject to a discount of 3d. per 1000 cubic feet; power users, 2s., subject to a discount of 3d.; all other consumers, 2s. 6d., subject to a discount of 3d. Private consumers to pay quarterly, and be allowed discount if paid within 21 days from date of demand; trade consumers to pay monthly, and where the consumption amounts to 23,000 cubic feet or upwards in any month, to be allowed 3½d. per 1000 cubic feet discount, if the account be paid on or before the 14th of the following month. The Chairman (Mr. James Pilkington) moved the confirmation of the minutes. Mr. A. Hargreaves, in seconding the motion, said the profits of the gas undertaking in 1910 were £2800, with a consumption of 67 million cubic feet of gas. They estimated that for 1911 it would be 70 millions; and the reduction had been based on this figure. The total cost of the reductions would be £1000; and a like amount would be applied for the relief of rates. A further sum of £500 was required for interest and sinking fund charges; so that the Committee would be left with a profit balance of £300, which he considered a fair margin. The motion was carried.

LANCASTER CORPORATION GAS UNDERTAKING.

The Profits Realized—An Explanation.

At the last monthly meeting of the Lancaster Town Council, the subject of the profits realized from the gas undertaking came before the members.

On the presentation of the minutes of the Gas Committee for confirmation,

Alderman PRESTON said that at the last meeting, when referring hurriedly to the gas undertaking, he made what had been described as a false, inaccurate, or misleading statement. He made it in perfectly good faith, and merely wanted to show that from the time the undertaking came into the hands of the Council the price of gas to consumers had been reduced from 4s. 2d. to 1s. 11d. per 1000 cubic feet. He also pointed out that the ratepayers as such were entitled to something, and said that for ten years after the undertaking was taken over the Corporation got nothing out of it. This statement—if he made it—was misleading. He meant that the Corporation got nothing towards the rates; but during that time the undertaking was built up on a firm foundation, and the cost of gas was brought down to 2s. 6d. per 1000 cubic feet.

Alderman HELME said Alderman Preston had acted in a generous and honourable manner to the Gas Committee and the Gas Manager (Mr. Charles Armitage) in the statement he had just made. In the "JOURNAL OF GAS LIGHTING" it was reported that the statement had been made that "for at least ten years the Corporation derived no benefit at all from the gas undertaking." Alderman Preston did not say exactly this, but meant that no assistance had been given to the rates by the undertaking for the period named. Perhaps the Council might be interested to know that the Corporation purchased the gas-works in 1880. The Gas Company's capital was £30,000 in 10 per cent. stock, *plus* £7000 of mortgages. The Corporation paid £80,000 for the stock, and par value for the mortgages; each shareholder was allotted £266 13s. 4d. of 4 per cent. irredeemable stock for each £100 of 10 per cent. gas stock. Subsequently the Corporation obtained powers to issue 3 per cent. redeemable stock, and gave to the stockholders £133 6s. 8d. of this stock for each £100 of 4 per cent. stock. This made the ultimate cost of the purchase £355 11s. for each £100 of the Gas Company's stock, or £106,665 of Corporation stock for £30,000 of the Company's stock. This showed that the capital account had been considerably watered; hence the Gas Committee's desire to defray the cost of extensions of plant out of surplus profits. Previous to the purchase of the works, the gross price of gas was 4s. 6d. per 1000 cubic feet. In July, 1880, the price was reduced to 4s. In 1889—a period of nine years after the purchase of the undertaking—the price had been reduced to 2s. 6d. gross, less 10 per cent. discount; making the net price 2s. 3d. Other reductions had since been made, especially

for motive power. In 1880, the net profits (omitting shillings and pence) were £1135; 1881, £636: 1882, £362; 1883, £2926; 1884, £3174; 1885, £1475; 1886, £1596; 1887, £1350; 1888, £1744; 1889, £1773—a total of £16,177. Out of this sum a reserve fund was formed during this period amounting to £6396. The balance of £636 in 1881 was carried to the borough fund in aid of the rates; and the remainder (£9144) was expended on extensions of plant.

The minutes were approved.

COVENTRY CORPORATION GAS DEPARTMENT.

A Review of the Position.

We learn from our local correspondent that the business of the Coventry Corporation Gas Department continues to show a satisfactory increase, due to the rapid development of the city. Since the issue of the annual report of the Gas Committee, a steady rise has become apparent, notably in the number of prepayment meter users. This is the natural result of the large amount of working-class property erected, for which there is a very great demand. As a matter of fact, the distribution of these meters locally is increasing at the rate of 120 per month; and this department now constitutes a very important branch of the undertaking. The prices charged for gas vary from 2s. 4d. to 1s. 9d. per 1000 cubic feet, according to the quantity used per quarter. In the case of consumers by prepayment meter, an additional charge of 8d. is made, as in their case the user pays nothing for the meter or for any repairs that may become necessary. Moreover, the department has to make allowance for removals, which are somewhat frequent; so that the additional 8d. is intended to cover all extras. Consumers of this class are unsettled, as evidenced by the fact that as many as fifteen removals will occur in a day. It is hoped that the results of the ensuing year's business of the department will enable a reduction in price to be made of 2d. per 1000 cubic feet. In regard to coal supplies, the department is well provided for, as the contracts are placed in the summer, and cover a period of twelve months—from June to June. Supplies are obtained mainly from North Staffordshire, South Yorkshire, and Derbyshire. The new works are complete as far as one section is concerned, and have a capacity of 5½ million cubic feet per day. During the past year, a little more than four million cubic feet daily has been sent out as the maximum; so that there is room for a further increase of at least 25 per cent. before the total capacity of the works is reached. It is calculated that, if the present rate of increase is maintained, it will be five or six years before it will be necessary to erect further buildings at the works.

PUBLIC LIGHTING OF ASHFORD, MIDDLESEX.

A Voluntary Rate Adopted.

We learn from a correspondent that the enlightened portion of the inhabitants of Ashford, Middlesex, are still fighting hard to light the district in which they live, despite the obstinacy of those who prefer to dwell in darkness. A start in the right direction has been made.

It may be remembered that attention was drawn to this matter in the "JOURNAL" for the 10th of October, on the occasion of the last poll of the inhabitants which was necessary before the Lighting and Watching Act of 1833 could be adopted. The local Council are unanimous in favour of lighting the most important part of the 14 miles of public roads; but before any action can be taken, the Act has to be adopted by a parish meeting. It is here that the block occurs. It is only necessary for one individual to demand a poll of such a meeting; and on the last occasion, after the Council's decision, nine persons, out of a population of 5000, were against the lighting scheme, and the ratepayers were put to the expense of a poll. Of the 617 required to vote, 410 had to be in favour of lighting. Unfortunately, however, it was a very rainy day when the poll was taken, and only 351 persons recorded their votes. This was 266 below the number needed for the adoption of the Act; but 326 were in favour of the lighting, and only 25 against it. So that, under the antiquated Act of 1833, which was passed when gas lighting was in its infancy, no further action can be taken at the public expense for five years.

The progressive members of the community, however—nothing daunted, and backed by a few energetic councillors—have not allowed the matter to rest. There have been many meetings and conferences, and, in conjunction with the local Coronation Committee, a meeting was recently held at which it was unanimously decided that the balance in the hands of the Committee should be expended in the erection of a handsome standard lamp, to be placed at the junction of Fort Bridge and Church Roads, in commemoration of the reign of His late Majesty King Edward the Seventh (a most appropriate memorial). The lamp is to be provided with three burners, and it will furnish a light at a very dangerous spot. The Committee have since met, and resolved upon a voluntary lighting rate. When it is remembered that the neighbourhood contains the large West District Schools, with its 1000 inmates and teachers, and the Welsh Girls' School, with 200 residents, further arguments in favour of lighting should be unnecessary.

The correspondent who furnished the foregoing particulars remarks that what is wanted for the country in general (in view of what is taking place at Ashford and other places) is that the obsolete Lighting and Watching Act should be either repealed or so amended by Parliament that ratepayers should be free to carry out their expressed wishes to light their towns, as voiced by their representatives in Council, and not be put to the needless expense of a poll every five years and then not be able to obtain their requirements. The safeguards in the Act were doubtless beneficent when it was necessary to keep the Overseers from swamping the poll; but they now are no longer needed, and should be swept away. The Staines and Egham Gas Company have helped, and are still helping, the voluntary Lighting Committee; while help is also being obtained from outside to put an end to state of things that ought no longer to exist.

PRESENTATIONS TO MR. AND MRS. JOHN YOUNG.

The dining-room at the works of the British Gaslight Company at Hull was prettily decorated on the evening of the 22nd ult., when a pleasant gathering of about six hundred of the officials and workmen took place for the purpose of offering their congratulations to the Manager, Mr. John Young, and to Mrs. Young, on the occasion of the anniversary of the birthday of the former, and to ask their acceptance of some more tangible expression of the esteem in which they are held. Accompanying Mr. and Mrs. Young were the Misses Margery and Jennie Young.

Mr. Arthur Cartledge, one of the workmen, on behalf of his colleagues, wished Mr. Young many happy returns of the day. He explained that at a recent gathering in the hall Mrs. Young spoke of the increased cost of living; and through the efforts of Mr. Young they were to-day enjoying an increase of wages, which was appreciated by everyone. When they met at a later date to pass a unanimous vote of thanks to the Directors, the suggestion was thrown out that they should testify their appreciation to Mrs. Young; and it was decided to make a presentation. The response was a very good one. The gentleman upon whom he was going to call to make the presentation had spent fifty-one years with the Company. He felt their gift would be greatly appreciated, inasmuch as it was subscribed to by almost every workman on the station. Mr. Cartledge then called upon Mr. Frank Milner to make the presentation to Mrs. Young on behalf of the workmen; and he did so amid loud applause.

Mrs. Young, having received the gift—a handsome massive table centre—thanked everyone present for it, and said it would be one of her most cherished possessions.

Mr. Lovatt, the Chief Clerk, then asked Mr. Young's acceptance, on behalf of the officials, of a gentleman's dressing-case and a pair of binoculars, as a token of their esteem and regard. He expressed the hope that Mr. Young would long remain their chief. He had worked in business with him for twenty-five years, and had found him an ideal manager.

Mr. Young, in reply, said he could hardly find words suitable to express his thanks for the gift. The workmen, he declared, were just as loyal as the officials, and it was delightful to reign over a family of brothers such as they were. The first unpleasantness and quarrel was to come. The gift was worth ten times its value by reason of the kind thoughts that had prompted the givers.

Refreshments were served to the company during the evening; and an excellent programme of music was rendered.

TELEPHOS LIGHTING COMPANY, LIMITED.

The First Ordinary General Meeting of this Company was held on Friday, at Capel House, New Broad Street—Mr. A. E. BROADBERRY, Assoc.M.Inst.C.E. (in the unavoidable absence of Captain A. St. J. Cooke, the Chairman) presiding.

The SECRETARY (Mr. C. A. Underwood) having read the notice convening the meeting and the report of the Auditors,

The CHAIRMAN, in moving the adoption of the Directors' report and the statement of accounts, which had been circulated among the shareholders, said that if their Chairman had been present to place before them properly the facts and figures relating to the year's work, he was sure they would have gone away feeling that, for a first year's experience, the results were very encouraging rather than otherwise. It was true that the balance was on the wrong side; but there were necessarily many items of expenditure incidental to the start which would in all probability not be repeated in the second year. For instance, they had written off nearly £700 in depreciation of the assets taken over from the old Company. Then exceptional expense had been incurred in the organization and remodelling of the business. Orders for both domestic and street lighters were increasing; and many of the expenses would not be materially greater with an augmentation of business even to the extent of threefold or fourfold. So long as they could maintain the increase of business at a faster rate than the growth of expenses, they were making towards the time when they would be working at a satisfactory profit. But maintaining the increase in business brought them face to face with their great and constant trouble—viz., lack of funds. He might mention that the sales for the three years from October, 1908, to September, 1911, were—

		Telephos.	Street Lighter.
1908–9	Old Company	£1415 16 4 ..	—
1909–10	Old Company	1554 15 0 ..	£1111 5 1
1910–11		3203 3 4 ..	1903 11 0

The increase in the past had not been nearly so fast as it might have been, not because there was not business to be done (as a matter of fact there was plenty of it), but because they had lost orders as they could not afford to hold stock in hand sufficient for prompt delivery of very large orders when they came. If they could have supplied all orders promptly during the past year, they would have done at least twice the amount of business in the domestic lighter; and if, in addition, they had only had plenty of funds with which to advertise the "Telephos" system, and make it known to the general public, they would have done a great deal more. They really ought to advertise. It was their business to make gas consumers want the "Telephos" by telling them all about it in attractive advertisements. With regard to the street lighter, though it had been successful wherever it had been tried, it ought to be kept constantly before gas directors and officials by advertisements in the trade journals. But all this required money. Good installations had been put up in Battersea, Stoke Newington, Enfield, Wood Green, Wolverhampton, and Langley Mill, besides many others of less importance, on sale outright; but a great deal of business could be done on the deferred payment or on the rental system at remunerative rates. This would establish a permanent income, independently of any cash trade; but without the capital to buy the

stock, they could not let on hire. They were making demonstrations in several important towns; and they expected good orders as the result. But they were compelled, under existing conditions, to work modestly. To sum up, they were in the position of having a pospect of a very good harvest. All they wanted was money to prepare the soil, sow the seed, and carry them over until harvest time.

Mr. CORBETT W. WOODALL seconded the motion; and, after a brief discussion, it was carried unanimously.

The retiring Auditors (Messrs. Cash, Stone, and Co.) having been re-elected, a vote of thanks was accorded to the Chairman, Directors, Managers, Secretary, and staff, and the proceedings closed.

AN ENGINEERING COMPANY'S TECHNICAL LIBRARY.

Its Value to the Employees.

In a paper read by Mr. F. N. Morton a short time ago before the Special Libraries Association, he gave the following account of the way in which technical publications are made use of by the employees of the United Gas Improvement Company, of Philadelphia.

Some years ago, our Company, appreciating that the mass of information contained in its library was buried beyond hope of usefulness, employed an engineer, in his time at the head of his profession, to index the books, and particularly the technical periodicals. At the same time one of the clerks, the head of the filing department, was delegated to index the current periodicals as received. This arrangement was continued until about eight-and-a-half years ago, when the writer was transferred from the plant of which he was then superintendent to his present position.

The indexing done by the clerk was as satisfactory as could be expected. The man had taken a short correspondence course in gas-works engineering, and his position, moreover, brought him into close contact with the technical work, and in this way familiarized him with the business. It was thought, however, that a trained engineer, and one who had long experience, would be better fitted for the peculiar duties of technical librarian; and the clerk was therefore relieved of this part of his work.

The writer is a graduate of a technical college, and has spent seventeen years serving in all departments of the gas and electric business, both technical and commercial. In his last position, his associates organized a reading club, to whose members were assigned the various trade papers for abstracting and presenting at the meetings of the club. He took part in this, and, in addition, had for a number of years before personally kept an index of his own of articles of technical interest or value. In looking for a man for librarian, the officials of the Company, hearing of this, selected him for the position.

At first, the principal work was supposed to be keeping the various officials and heads of the departments informed of the current progress and developments along the lines in which our Company are interested. This is done by a system of abstracts.

The forty periodicals taken by the Company are read, and all articles of interest or value abstracted; the abstracts being sent to those entitled to receive them. Each abstract contains the gist of the article in question, and is prepared with the idea of making reference to the original paper unnecessary except under special conditions. In fact, one of the Company's employees was in the library looking up information on a certain point, when he was handed the abstract of an article bearing on the subject, with the remark that if he would wait a moment he could have the original paper. He declined the offer, saying that he found that he could get more out of the abstracts than he could from the originals, because the former contained the gist of the articles without a mass of confusing details.

These abstracts are arranged and classified for filing just as references would be in a card index, except that, instead of a simple reference, the article itself is at hand in brief. In this way, classified subjects in the index file constitute a *résumé* of all literature available on the subjects in question since starting the system. The abstracts are sent out in batches of about twenty each, and appear more or less regularly according to the research work done by the department.

The work of indexing books and periodicals came logically under the charge of the librarian. The charge of the index files soon made a sort of bureau of information of the library, and questions began to come in—at first mostly technical, but rapidly becoming general. To answer some of these required a good general knowledge of applied science. For instance, a report was desired on the manufacture from atmospheric nitrogen of nitrates such as are used for fertilizing. On another occasion, a report was required on the manufacture of ozone. Another question required the calculation of the theoretical temperature of the flame of illuminating gas. In another instance, the question came up, and was turned over to the library, as to whether a patent on a certain appliance would hold. A study of the subject, which required a knowledge of the laws of combustion and the action of fuel in furnaces, was made, the history of the art was gone over, and a collection made of literature and previous patents bearing on the subject. This was abstracted, and the report thus prepared was given to the attorney and formed the basis of his decision.

A question that was put to the library was in regard to the temperature and pressure to which it would be necessary to subject illuminating gas to remove certain constituents. This required a knowledge of the laws of vapour tensions, and a calculation by Boyle's law of the reduction in volume necessary to produce at a selected temperature the pressure at which condensation begins.

In many cases a technical man can be of assistance in other ways, one of which is that frequently people do not know what they really need. A striking instance of this was a case in which one of the employees asked for the specific heat of a certain substance. A little questioning brought out the fact that he was trying to calculate the amount of fuel necessary to melt the material. It was explained to him that it was quite as necessary to know the latent heat of fusion as the specific heat. A simple answer to the question asked would, in its way, have been as misleading as a misstatement.

Of course, many of the questions asked require no technical knowledge to answer, even though technical in themselves. To find, for example, the effects of hydrogen in gas upon the efficiency of a gas-engine, it was only necessary to look up articles on the efficiency of gas-engines. Again, to find an aqueous solution of a certain gravity was simply a case of going directly to a table of solutions and picking out the one that seemed most suitable.

Many of the questions asked are not technical. The representative of a company recently asked for a list of court decisions allowing the erection of gasholders contrary to the protests of property owners in the vicinity. Court decisions were also asked in regard to the right of a company to sell illuminating gas when it was chartered as a company to engage in the sale of fuel gas. One odd question was: "What was meant sixty years ago by 'carburetted hydrogen'?" It seems that a certain company was authorized by its Charter to manufacture and distribute "carburetted hydrogen;" and the question arose as to whether it was living up to its requirements. The question was turned over to the library. After an extended search, about twenty references containing such statements as "carburetted hydrogen gas, usually supplied to the public," "the various plants and processes employed in manufacturing carburetted hydrogen," &c., were discovered. A definition of carburetted hydrogen almost as broad as charity was found, which read: "A compound of carbon and hydrogen, of which there are several species, such as oil gas, coal gas, olefiant gas, oil of lemons, otto of roses, oil of turpentine, petroleum, naphtha, naphthalene, oil of wine, caoutchoucine, and caoutchouc."

Instances might be multiplied indefinitely, but enough have been given to show the scope of the work done by the department. The librarian is always on the look-out for new information, and makes a point of investigating any source that seems at all promising. In view of the wide range of subjects covered, all is grist that comes to his mill; and, with the accumulation of data with time, the department is constantly growing in importance and value to the Company.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is announced that Mr. W. B. M'Lusky, Gas Engineer, Perth, has been recommended for the appointment of Gas Manager and Engineer to the Halifax Corporation, at a commencing salary of £500 per annum. Mr. M'Lusky's father was employed at the Port Glasgow Gas-Works; and in this way he came to do work for Messrs. Arrol, and became known. The connection in a very few years brought to the son the position of Manager of the Kelso Gas Company. This was soon followed by the holding of managerial positions at Kircudbright and Selkirk, whence the Corporation of Perth secured his services about ten years ago. Mr. M'Lusky has been distinguished by devotion to his work and attention to all its details. To begin with, the list of applicants at Halifax numbered 63; but it was reduced by the Sub-Committee to seven, and afterwards to four. All four appeared before the Committee; and prolonged interviews took place with each. During Mr. M'Lusky's tenure of office in Perth, he has completed an installation for the carbonization of coal in inclined retorts; and he is at present under negotiation for the construction of a vertical retort installation.

The Falkirk gas undertaking continues to give a good account of itself. From the last monthly report submitted by Mr. W. Wilson, the Gas Engineer, it is shown that the net increase in the quantity of gas sent out from May 15 to Nov. 30 was equal to 38 per cent., compared with the preceding year. The gas made per ton of coal carbonized was equal to 9000 cubic feet. Mr. Wilson also reported increases in the number of consumers, new services, and cookers.

From the annual abstract of accounts issued by Mr. Robert Paton, the City Chamberlain of Edinburgh, on Saturday, it is shown that the capital debt incurred by the Edinburgh and Leith Gas Commissioners amounts to £1,530,200, out of a total civic indebtedness of £7,706,002. By way of comparison, it may be stated that the capital debt for electricity is £655,469, water £2,289,637, and tramways (cable) £946,757. The city area amounts to 11,415⅛ acres, the valuation is £3,337,081, and the population of Edinburgh at the last census was 320,315.

The "Fife Free Press," in its annual review for the year 1911, after remarking that municipal affairs in Kirkcaldy had been proceeding quietly but satisfactorily, goes on to say that among the more important of the undertakings carried out by the "City Fathers" was the taking over of the business of the local Gas Company. Already an increased demand was being experienced, and hopes were entertained that some of the neighbouring villages would follow the example of Thornton and arrange with the Corporation for a supply of gas.

During the past year, under the direction of Mr. A. Waddell, the Inspector of Lighting, the "Dunfermline Free Press" remarks that an improvement in the public lighting has been shown in various parts of the city, and notably in High Street, where high-pressure gas is now used with advantage. The lighting of common stairs and back courts had engaged the attention of the Lighting Committee; but a definite decision had not been arrived at. It is hinted that the laying of the gas-pipe from Dunfermline to Culcross would be undertaken.

The Falkirk Town Council have agreed to oppose the Provisional Order being promoted by Mr. George Brown, of London, under the title of the Linlithgow and Falkirk District Electric Lighting Order, on account of its probable effects on the Council's gas undertaking in Larbert, Stenhousemuir, Carron, and Carronshore.

At Hamilton during the past year gas matters have progressed very satisfactorily. A further reduction of 2½d. per 1000 cubic feet was intimated in the summer, making the price 1s. 8d. per 1000 cubic feet for ordinary purposes, and 1s. 5½d. for power. The Gas Committee are considering the expediency of introducing gas to adjoining localities, including Blantyre. It is probable that the Blantyre extension will be carried out, as the Town Council have the power under their Gas Act of supplying the town with gas in bulk.

In the Hamilton Sheriff Court on Tuesday, there was a sequel to the explosion of acetylene gas on Nov. 13 last, whereby George Scott, 22 years, was killed. David Barrie M'Nab, of Clydesdale Bank House,

Bothwell, in whose employment Scott was, was charged with having in an outhouse there a quantity of carbide of calcium without a licence, and with using in connection with the same a fixed generator for acetylene gas without exhibiting near it a certificate signed by the maker or builder, and without having full and detailed instructions as to the care and use of the generator posted up, as required by Statute. A plea of guilty was tendered by Mr. M'Nab; and his agent, Mr. J. B. Ritchie, said the offence had been committed largely through ignorance of the Orders in Council, which were being continually revoked or re-enacted. Sheriff Shennan imposed a fine of £3, remarking that he could not understand a man in the position of the accused being in ignorance of the law on the matter.

In regard to the paragraph in last week's "Notes" referring to the price of gas at Coatbridge, the Secretary of the Gas Company (Mr. W. Johnston) writes to point out that their rate for gas for the past year was 1s. 4d. per 1000 cubic feet for motive power and 1s. 7d. for ordinary consumers. He also mentions that Hamilton is selling gas at a cheaper rate than Johnstone—namely, 1s. 9d. (or rather 1s. 8d., as mentioned in the paragraph above) per 1000 cubic feet all round to ordinary consumers, as against the latter's charge of 1s. 10d., reduced to 1s. 9d. after the consumption of the first 100,000 feet.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 30.

Sulphate of Ammonia.

Notwithstanding the intervention of the holidays and the consequent decrease in the volume of trade, the market for this article has been very firm during the past few days. The present situation has no doubt been brought about by the actual, as well as the threatened, difficulties in the labour world; and all available supplies have been readily absorbed at hardening prices. The closing quotations are £14 3s. 9d. per ton f.o.b. Hull, £14 5s. per ton f.o.b. Liverpool, and £14 7s. 6d. per ton f.o.b. Leith. Little fresh business has transpired in the forward position; but it is reported that first-hand sales have been made at £14 7s. 6d. per ton f.o.b. Leith, and at £14 6s. 3d. per ton f.o.b. Liverpool, for delivery during the first half of the year 1912.

Nitrate of Soda.

The general tone of the market is somewhat easier; but holders of spot parcels are still able to realize 10s. 1½d. per cwt. for ordinary and 10s. 4¼d. for refined quality.

LONDON, *Jan.* 1.

Tar Products.

There is little alteration in the market for tar products; but prices still remain very firm. Pitch is in fair demand, and well maintains its price. Benzols are steady; but there is little fresh inquiry. Solvent naphtha is improving in tone; and the inquiry is good for both prompt and forward delivery. Heavy naphtha is likewise in good demand. Crude carbolic remains in about the same position; but there is not the excitement which was experienced a week or so ago. Creosote is very firm, and the inquiry is good in all quarters.

The average values during the week were: Tar, 22s. 9d. to 26s. 9d. *ex* works. Pitch, London, 41s. 6d. to 42s. 6d.; east coast, 41s. 6d. to 42s.; west coast, Clyde 40s. 6d. to 41s. 6d., Manchester 40s. 6d. to 41s., Liverpool 41s. 6d. to 42s. Benzol, 90 per cent., naked, London 11d.; North, 10½d. to 10¾d.; 50-90 per cent., naked, London, 10d. to 10¼d.; North, 9½d. Toluol, naked, London, 10d.; North, 8½d. to 9d. Crude naphtha, in bulk, London, 4½d. to 5d.; North, 3⅝d. to 4¼d. Solvent naphtha, naked, London, 10½d. to 11d. f.o.b.; North, 9½d. to 9¾d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s. 0½d. f.o.b.; North, 10d. to 10½d. f.o.b. Creosote, in bulk, London, 2¾d. to 3⅛d.; North, 2⅝d. to 2⅞d., salty; 2⅝d. to 2¾d., liquid. Heavy oils, in bulk, 3½d. to 3¾d. Carbolic acid, casks included, 60 per cent., east coast, 3s.; west coast, 3s. Naphthalene, £4 10s. to £10; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1½d. to 2d. per unit, packages included and delivered.

Sulphate of Ammonia.

With the close of the year, there has not been any fresh development, and, on the whole, prices have remained unchanged. Actual Beckton is quoted to-day at £13 17s. 6d. Outside London makes are £13 7s. 6d. to £13 8s. 9d.; Hull, £14 2s. 6d.; Liverpool, £14 3s. 9d.; Leith, £14 5s. to £14 6s. 3d.; Middlesbrough, £14 2s. 6d.

Ottawa City Water Supply.—We learn from the Engineering Supplement to "The Times" that the water supply of the city of Ottawa has lately been under consideration by a Commission of four experts, in consequence of an outbreak of typhoid fever last winter. Their report has just been handed to the municipal authorities. Unfortunately it is not unanimous, as three of the Commissioners—Mr. Hazen, Dr. Hodgetts, and Dr. M'Cullough—recommend the catchment of the Blanche River and a gravitation system, while Mr. Charles H. Keefer, the fourth member, dissents from their findings, and favours the Ottawa River as the future source of supply, with the addition of filtration plant. The majority find the water of the Ottawa River to be polluted and unfit for a public supply at the present intake or at any other point where it could reasonably be placed. They are of the opinion that the pollution will increase and not diminish; that no system of sand filtration, whether simple or multiple, is capable of removing the colour and the excessive amount of organic matter in the water; and that the catchment of the Blanche River in the Province of Quebec, 15 miles away, is capable of furnishing an abundant supply of the purest water. It is stated that 50 million gallons of water a day can be obtained from this source, with full storage of flood flows, or sufficient to supply 100 gallons of water per head to 500,000 people. The estimated cost of the works is £500,000.

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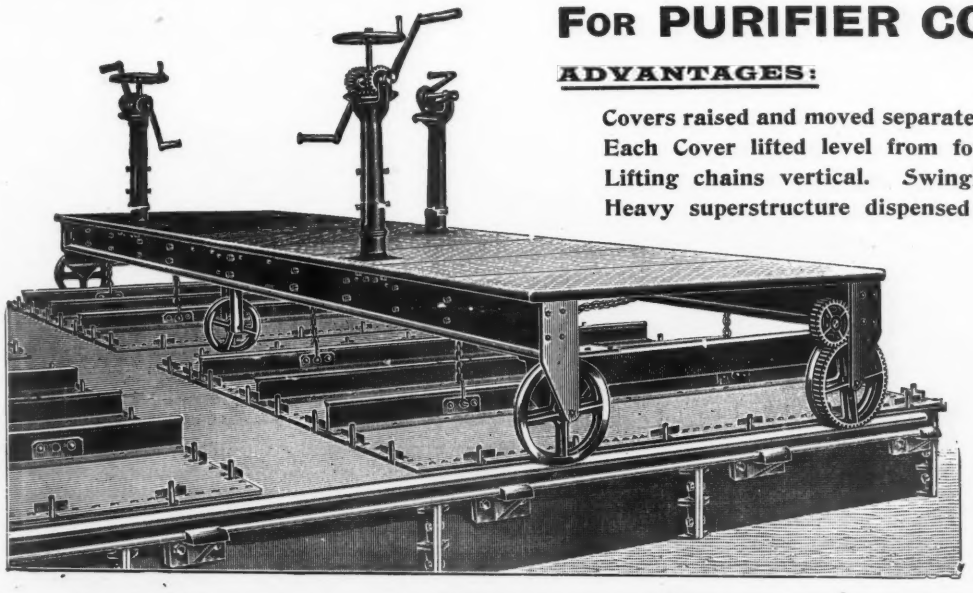

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COAL TRADE REPORTS.

Northern Coal Trade.

There has been a fair production of coal to meet the long contracts; but there is now the occurrence of the holidays, which will lessen the output for the first week of the new year. There is a strong demand for most classes of coal. In steam kinds, best Northumbrians are from 11s. 6d. to 11s. 9d. per ton f.o.b., second-class steams are 10s. 9d. to 11s. 3d., and steam smalls are about 5s. to 6s. 3d. The production per man is good, and is well taken up. In the gas coal trade, the demand is very strong, both for home and for export. The prices are well maintained, though it must be remembered that, with the heavy contracts that are running, there is only a limited amount for sale at the high market prices. Best Durham gas coals are from 12s. 6d. to 12s. 7½d. per ton f.o.b.; and second-class gas coal is about 11s. 6d. to 11s. 10½d. "Wear special" coals are about 13s. to 13s. 3d. per ton f.o.b. There is not much to say as to contracts; but one sale has been made of good Durham gas coals for shipment over next year at a price leaving 11s. 6d. per ton at the colliery, which is a good figure for a fair quantity. Coke is firm. Although gas coke is now in very heavy production, it is in good demand, and is quoted from 14s. 10d. to 15s. 3d. per ton f.o.b. in the Tyne for good makes.

Scotch Coal Trade.

The year opens with a firm demand for coal and a plentiful stock of fair varieties. Violent changes are not expected; and it may be that after all the market may have seemingly the best of it. The prices quoted are: Ell, 11s. 9d. to 12s. per ton f.o.b. Glasgow; splint, 12s. to 12s. 9d.; steam, 10s. 3d. to 10s. 6d. The total local shipments for the week amounted to 340,487 tons.

Water Supply of Epsom.—The Epsom Urban District Council have rescinded a resolution passed by them authorizing the purchase of land at Tattenham Corner for the purposes of water-works; it having been found that there is an ample supply to the Grand Stand at Langley Bottom, and that the new asylum which is to be erected will not be occupied until 1916.

Topsham Water Supply.—At the meeting of the St. Thomas Rural District Council last Thursday, the Committee appointed to consider the provision of an effecient water supply for Topsham recommended that the Council should adopt a scheme for the acquisition and extension of the supply at present owned by the local Water Company. The cost of this scheme was estimated at £6025, and the annual cost at £627 while the capital outlay was being repaid, and £265 15s. afterwards. The Committee believed that, with certain modifications, particularly in respect of a water-tower, the latter scheme could be carried out at a cost of £1000 less than the estimate. After some discussion, the Council adopted the scheme.

Gas Profits and Gas-Fittings at Huddersfield.

When the Gas Committee's minutes were before the last meeting of the Huddersfield Borough Council, Mr. Law Taylor said he noticed that the Town Clerk had had a letter from the Town Clerk of Salford in regard to restrictions sought to be imposed upon the Salford Corporation in the application of gas profits to the relief of the rates. He would like to know what would be the position if the Huddersfield Corporation accumulated a fund for their productive undertakings? Could not the money be used to finance new undertakings? He believed that in a number of towns there was a "Common Good" fund (made up of profits), which was utilized for undertakings, instead of borrowing. He was opposed to handing over profits for the relief of the rates, as this method did not represent a fair distribution. The Corporation should sell as cheaply as possible; but if there were any profits, they should be used for further undertakings. Alderman Woodhead said that there was a "Common Good" fund at Glasgow; but the Huddersfield Corporation had no Act of Parliament under which such a fund could be established. The same object could be achieved by using profits for the relief of the rates, and then raising the rates for further undertakings. There was no real difference between this method and a "Common Good" fund. Subsequently, Mr. Wheatley introduced the question of the advisability of dealing in gas fittings and apparatus. He pointed out that their friends at Longwood sold everything used in the consumption of gas. This was done by a Company the Corporation had tried to buy out; and they might be sure that there was a profit in the business, or the Company would not enter upon it. What was good for a company was good for a corporation. The Mayor (Mr. G. Thomson) remarked that the Corporation already dealt in gas-stoves; and Alderman Jessop stated that the matter referred to had been frequently before the Council during the last few years. After discussions and interviews with tradesmen, however, it was always decided that it was undesirable for the Corporation to enter upon such an undertaking. An amendment that the question should be remitted for consideration to a Sub-Committee appointed to deal with the sale of coke in paper bags was defeated.

Asphyxiation by Gas.—A young man named Ernest Woodcock, a checker in the employment of Messrs. Bass and Co., at their depôt at St. Pancras Station, was found dead last Wednesday morning under circumstances suggesting asphyxiation by coal gas. A tragic feature of the affair is that Woodcock was to have been married on Boxing Day. He was seen on the morning of that day in the neighbourhood of St. Pancras, but did not appear at the town where the wedding was to have taken place. He was discovered by a fellow workman lying on the floor of his box with the jet of the gas-stove turned on full. Medical aid was summoned; but Woodcock was found to have been dead for some hours. At the inquest on Friday, a verdict of suicide was returned.

The Proof——is in the Heating.

AS every Gas Engineer knows, it takes something more than a mere gas burner to properly heat an apartment.

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THE claims of the "ST. ANDREW" are not of this unimpressive kind. They are based not only on an experience of FIFTY YEARS in the making of Gas Appliances, but upon actual tests made in our completely equipped laboratories. The "ST. ANDREW" is warming to-day many thousands of Shops, Schools, Places of Worship, and similar buildings, and has never once been known to fail.

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284.

Fine Display of Gaslight in D'Olier Street, Dublin.

The following appeared in the "Freeman's Journal" on the 22nd ult.: "Persons walking along D'Olier Street last evening must have noticed the wonderful light outside the Junior Army and Navy Stores. The whole frontage of the establishment was flooded in light, and part of the street was as bright as it is in the daytime. The light was given by five large lamps with incandescent burners, which, it was learned, are in the aggregate considerably over 20,000-candle power. The light was not glittering or hurtful to the eyes. On the contrary, though intensely bright, it caused no strain whatever on the eyes, even when one stared at it. Compared with these brilliant lights, the ordinary lights looked like candles." Referring to the same matter, the "Irish Times" said: "The broad thoroughfare was bathed in a flood of light, just as if the noonday sun were high in the heavens. Each article in the attractive windows of the stores could be seen as clearly as in daylight; and every part of the thoroughfare was brilliantly illuminated. The gas lights shed a soft glow everywhere. The light was as steady as a moonbeam, and in no way trying to the eyes. It was in every way an ideal illuminant." To the officials of the Alliance and Dublin Gas Company credit must be given for this fine display.

Lancashire Farmers and Tar-Sprayed Roads.—The question of the tar-spraying of main roads in Lancashire was brought under the notice of the members of the Clitheroe Rural District Council at the December meeting. Mr. J. R. Thompson declared that the farmers had no definite cause for complaint under this head. He was prepared to admit that tar placed on small granite setts made the latter rather slippery; but the County Council had tried a variety of methods with a view to minimizing this trouble. He (Mr. Thompson) had spoken to several farmers on the subject; but they had no feasible suggestion to make as to how the roads should be treated. In his opinion, the Main Roads and Bridges Committee of the County Council were endeavouring to make the roads suitable for all kinds of traffic. No resolution was adopted with regard to the matter.

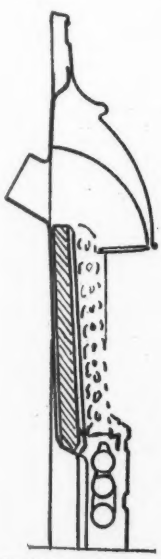
Opposition to the Belfast Gas-Works Extensions.—We learn from the "Belfast News Letter" that the battle of the sites in reference to the proposed extension of the gas-works has not yet concluded, for further opposition to the Corporation scheme is threatened in connection with the Bill of which notice has been given for next session. A Committee has been formed, representing certain traders in two of the wards, who consider that the carrying out of the proposals in the Bill would be detrimental to many of the trades in the district, and would also have a depreciating effect on property. The traders concerned have drawn up a statement, copies of which have been sent to all the members of the Council and to the papers, in which they set forth their opinions and the reasons for their opposition. Accompanying this circular is a map showing the land to be acquired compulsorily under the Bill, as well as the site of the old abattoir on which a portion of the extension works may be erected.

APPLICATIONS FOR LETTERS PATENT.

28,450.—Spencer, W. H., "Reflecting fixtures or chandeliers." Dec. 18.
28,451.—Spencer, W. H., "Illuminating devices." Dec. 18.
28,514.—Wallis-Jones, R. J., "Lighting burners." Dec. 18.
28,523.—Jackson, T., and Ramsay, A., "Gas flash-light advertising devices." Dec. 18.
28,564.—Schaffer and Budenberg G. m. b. H., "Devices for setting counting mechanism to zero." Dec. 19.
28,585.—Gibson, T. S. F., "Gas-fires." Dec. 19.
28,588.—Lane, E. J., "Gas and air compressor." Dec. 19.
28,630.—Arndt, M., "Registering devices for instruments acting under air, gas, or liquid pressure." Dec. 19.
28,674.—Thorp, T., F., & H. T., "Rotary exhausters and compressors." Dec. 20.
28,681.—Dempster, R., and Sons, Ltd., and Brockway, F. G., "Charge indicator for use with vertical retorts." Dec. 20.
28,694.—Rothman, E. O., "Gas-fired furnace." Dec. 20.
28,700.—Continental-Licht-Apparatebau G. m. b. H., "Gas-burners for working metals." Dec. 20.
28,732.—Rauch, M., "Suspension and adjustment of gas-lights." Dec. 20.
28,734.—Efflinger, R., Krenek, J., and Lechner, R., "Gas-supply pipes or taps." Dec. 20.
28,736.—Fitz, H., "Coin-freed apparatus for the supply of water." Dec. 20.
28,740.—Wakefield, C. C., and Carbic, Ltd., "Acetylene generators." Dec. 20.
28,757.—Thompson, W. P., "Sterilizing water or other liquids by means of ultra-violet rays." A communication from Ozonges. m. b. H. Dec. 20.
28,772.—Watts, J. E., "Inverted burners." Dec. 21.
28,826.—Brooks, R. A. E., "Automatic folding gas table cabinet." Dec. 21.
28,852.—Duckham, A. M'D., "Vertical retorts." Dec. 21.
28,863.—Gow, J., and the Gas-Meter Company, Ltd., "High-pressure gas-meters." Dec. 21.
28,898.—Coventry, W., "Incandescent burners." Dec. 22.
28,916.—Sadler, H. S., and Ashmore, Benson, Pease, and Co., Limited, "Joint for the lids or covers of gas-purifiers and the like." Dec. 22.
28,955.—Round, J. H., "Valves for fluids under pressure." Dec. 22.
28,970.—Glover, T., "Gas-lamps." Dec. 22.
29,004.—Abel, F., "Gas-irons." Dec. 23.
29,021.—Biddlecombe, F. G. L., "Generation of combustible gas." Dec. 23.
29,062.—Dempster, R., and Sons, Ltd., and Mitton, W., "Switches for mono-rail telpher tracks." Dec. 23.

COMMON-SENSE and THE HUMP.

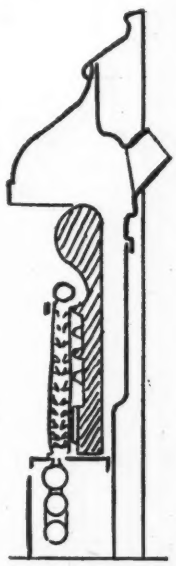
The colloquialism "Got the Hump" is a terse way of saying that there is something the matter with the person of whom it is descriptive. It describes an unhealthy mental attitude which is supposed to have something to do with the liver.



Section of D.S.O. Fire. No obstruction between fuel and canopy.

It is common knowledge that people with the "hump" pass it on,—it is infectious. Our "D.S.O." Fires have no hump, but their success seems to have created that undesirable state in the minds of some people, who have passed it on and embodied it in the bricks of their fires and made them unhealthy, *i.e.* unhygienic. The hump on the brick prevents fumes having a free passage to the canopy, with the result that they come out into the room, making the air unhealthy and giving the occupants the hump and a disgust with Gas Fires, which, needless to say, is detrimental to the Gas Industry.

Common-sense is the antidote for the human hump. Apply common-sense to Gas Fires and it is at once apparent that a fire which has no hump to prevent free passage of the fumes to the canopy is not so likely to throw the fumes into the room. Fit this fire with a long pillar fuel, which acts as a guide for the fumes right up into the canopy, and you make assurance doubly sure. You then have a common-sense healthy fire.



Section of ordinary type of Fire with hump on brick to obstruct passage to canopy.

MAIN'S "D.S.O."

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
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British Coalite Company, Limited.—In a circular-letter addressed to the shareholders, the Secretary of this Company states that as the Auditors are unable to complete the audit in the time available, it is found necessary to adjourn the general meeting of shareholders until early in the present year. The Directors state that the negotiations referred to at the general meeting held in July last have reached a point which will enable them to communicate full particulars to the shareholders prior to the date of the adjourned meeting.

Gas-Workers' Wages at Bradford.—The question of gas-workers' wages has been considered by the Gas Committee of the Bradford Corporation, who had before them a letter from the men's Union. The Committee eventually decided to recommend to the Council certain increases, the approximate cost of which will probably amount to nearly £1200 a year. The proposed increases include an advance of ½d. an hour in the wages of yardmen, labourers, and purifier men, which will account for £940 a year; and there are also concessions to other grades of the employees.

The Improved Lighting of the City of London.—The Engineering Supplement to "The Times" recently contained, under the heading of "Electrical Notes," the following remarks by an engineering correspondent on the new public lighting scheme for the City of London, full particulars in regard to which were given in the "JOURNAL" for the 5th ult.: "It is scarcely fair to blame the City of London Corporation for having at last ceased, or at least adjourned, its prolonged search for the ideal in street lighting, and settled the question for the next decade by a businesslike compromise dictated by general convenience and expediency. The City will get more light at less cost under the decision to divide the work between gas and electricity; and presumably there will be no further experimentation. As the duty of the Corporation is to light the streets rather than to use them as the scene of a lamp exhibition, there is some weakness in the criticism which demands that mere value for money should not settle the question, but that technical competition should be further endowed. The general result of the Corporation's policy during the past few years has been to set a higher standard of public lighting. If it should happen that, starting where the City is leaving off, other public authorities may in the near future achieve still more brilliant illumination—since it is safe to prophesy that there will be marked improvement in both main and side-street lamps during the next ten years—it is still unreasonable to rebuke the City executive, as certain technical commentators are disposed to do, for entering now into a reasonable contract."

Price of Gas in Birmingham.—The Birmingham Gas Department, it is understood, intend to revise the prices charged for gas, and make appreciable reductions. Some time ago, the price to small consumers was reduced to 2s. 2d. per 1000 cubic feet, and now there will be a further reduction to 1s. 11d.; while consumers of more than 50,000 cubic feet per quarter will benefit to a corresponding extent. Users of prepayment meters will get 35 cubic feet, instead of 31 cubic feet, for 1d.; and where gas is being used for manufacturing and power purposes, it is proposed to make a reduction from 1s. 6d. to 1s. 4d. per 1000 cubic feet in the case of small consumers, with proportionate reductions to those using more than a million cubic feet a quarter.

Women Water Diviners.—The Londonderry Corporation, discussing recently a suggestion that a water diviner should be called to their assistance in finding water, listened to some pointed remarks from Mr. M'Farland about "old women going about with sticks looking for water, and pretending they had magical powers." No doubt the speaker, when he alluded to "old women," meant men with the mental and physical qualities usually ascribed to elderly females. But if he meant his words to be taken literally, he might have been surprised to be informed that a practical (and wealthy) lady in Johannesburg, without any pretence of "magical powers," found water with a divining twig in three places on a property which experts and engineers had given up in despair, and which could not find a tenant because no water was available. Guests at this lady's house frequently try water-divining as the newest garden-party diversion. One of the ladies possessing this power is well known in the theatrical world.

The Welwyn, Knebworth, and District Gas Company, Limited, has been registered with a capital of £12,000, in £10 shares. The offices are at Palace Chambers, Bridge Street, Westminster.

On the invitation of Mr. J. C. Hudson, the Vice-Chairman of the Littleborough Gas Company, the employees had supper together in the works at Christmastide. At the "smoker" which followed, the Directors of the Company were present, and the toast of their health was submitted by Mr. S. E. Halliwell, the Secretary and Manager; the responders being Messrs. J. C. Hudson, J. T. Rogers, and A. J. Law, J.P. Reference was made by the speakers to the good feeling existing between the Directors and the staff; and the hope was expressed that these pleasant relationships might long continue.

GAS COMPANIES' STOCK AND SHARE LIST.

The year wound up on the Stock Exchange with a short and very quiet week of four days. Business throughout was dull and apathetic, except in one or two special lines of interest, such as 'Buses and Undergrounds, where there was money to be made—and lost. The tightening of money kept Consols and other gilt-edged luxuries down; and Railways were hampered by the continued agitation of the more pugnacious among the labour leaders, or would-be leaders. The re-opening of the Exchange on Wednesday, after the holidays, was very inactive, and things ruled heavy all day. Government issues were weak, and Consols fell $\frac{3}{16}$. Railway prices gave way, and closed lower for the most part. In Americans, movements swayed up and down irregularly; but the Foreign Market was tolerably good. Thursday was almost lifeless; but Consols and other choice securities recovered a little. The cotton lock-out helped to depress Rails; and Americans were weaker. The general tendencies on Friday were similar; and there was no access of activity. The tone on Saturday was very fair; and the week—and the year—closed in a moderately cheerful mood. In the Money Market, there was a very strong demand which stiffened short loan rates materially; but discount terms eased down. Considering the season, business in the Gas Market was fairly well maintained. In Gaslight and Coke issues, the ordinary changed hands at 104⅞ to 105⅜—a rise of ¼. In the secured issues, the preference was done at 103¼, and the debenture at 80. South Metropolitan was quiet and firm at 116½ to 117. In Commercials, the 4 per cent. realized from 110½ to 111½, and the 3½ per cent. 105¼ special. Among the Suburban and Provincial group, Brentford old was done at 260½, British at 45, and Southampton at 107¾. In the Continental companies, Imperial marked from 189½ to 192 (a rise of 1½), Union 85½ (a fall of 1), ditto preference 132½, European 20¾, and Tuscan 8⅞. Among the undertakings of the remoter world, Primitiva was done at 7½ to 7$\frac{9}{16}$, ditto preference at 5¼ to 5⅜, and ditto debenture at 97½.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 12	5	Alliance & Dublin Ord.	79—82	..	6 1 11
374,000	Stk.	July 14	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	5	Sept. 28	7	Bombay, Ltd.	6—6½	..	5 7 8
50,000	10	Aug. 31	15	Bourne-	29—30	..	5 0 0
311,810	10	,,	7	mouth Gas	16¼—16¾	..	4 3 7
75,000	10	,,	6	and Water	14¼—14¾	..	4 1 4
380,000	Stk.	Aug. 16	13	Brentford Consolidated	256—261	..	4 19 7
330,000	,,	,,	10	Do. New	198—203	..	4 18 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	217—222	..	4 19 1
246,320	,,	,,	8	Do. A Ord. Stk.	156—159	..	5 0 8
490,000	20	Sept. 28	12½	British	44½—45½	..	5 9 11
120,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. Stk.	92—94*	..	4 5 1
109,000	,,	Aug. 16	6	Bromley, A 5 p.c.	127—132	..	4 10 11
165,700	,,	,,	4½	Do. B 3½ p.c.	97—102	..	4 8 3
82,278	,,	,,	5¾	Do. C 5 p.c.	117—122	..	4 10 2
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	80—82*	..	4 5 4
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	94—96*	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4¼—5¼	..	—
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	78—81*	..	5 11 1
157,150	Stk.	Aug. 16	5	Chester 5 p.c. Ord.	111—113	..	4 8 6
1,513,280	Stk.	,,	5/9/4	Commercial 4 p.c. Stk.	110—112	..	4 17 7
560,000	,,	,,	5½	Do. 3½ p.c. do.	105—107	..	4 19 8
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	75—77	..	3 17 11
800,000	Stk.	,,	4	Continental Union, Ltd.	85—89	−1	4 9 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	132—134	..	5 4 6
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
840,150	10	July 28	10	European, Ltd.	20—21	..	4 15 3
16,160,600	Stk.	Aug. 16	4/14/8	Gas-	104⅜—105⅜	+¼	4 9 6
2,600,000	,,	,,	3½	light	84½—86½	..	4 0 11
4,062,235	,,	,,	4	and	102—104	..	3 16 11
4,531,705	,,	Dec. 14	3	Coke	79—81	..	3 14 1
258,740	Stk.	Sept. 14	5	Hastings & St. L. 3½ p.c.	94—96	..	5 4 2
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	17—17½	..	6 5 9
131,000	Stk.	Sept. 14	7½	Ilford A and C	154—157	..	4 15 6
65,780	,,	,,	6	Do. B	125—128	..	4 13 9
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	92—94*	..	4 5 1
4,940,000	Stk.	Nov. 10	9	Imperial Continental	190½—192½	+1½	4 13 6
1,235,000	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	90—92	..	3 16 1

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	125—130	..	4 12 4
561,000	Stk.	Aug. 16	10	Liverpool United A.	219—221	+1	4 10 6
718,100	,,	,,	7	Do. B.	163—165	..	4 4 10
306,083	,,	Dec. 29	4	Do. Deb. Stk.	100—102*	..	3 18 5
75,000	5	Dec. 14	6	Malta & Mediterranean	4½—5	..	6 0 0
560,000	100	Oct. 2	5	Met. of	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne	100—102	..	4 8 3
541,920	20	Nov. 10	3½	Monte Video, Ltd.	12—12½	..	6 12 0
1,775,892	Stk.	July 28	4⅜	Newc'tle&G'tesh'd Con.	101½—102	+⅜	4 5 9
529,705	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	85½—87½*	..	4 0 0
55,940	10	Aug. 31	7/7/0	North Middlesex 7 p.c.	14½—15½	..	4 14 10
300,000	Stk.	Dec. 14	8	Oriental, Ltd.	134—136	..	5 17 8
60,000	5	Sept. 28	8	Ottoman, Ltd.	6½—7¼	..	5 10 4
31,800	53	Aug. 16	13	Portsea Island A	140—145	..	4 14 10
60,000	50	,,	13	Do. B	133—138	..	4 14 2
100,000	50	,,	12	Do. C	130—135	..	4 8 11
398,490	5	Oct. 12	8	Primitiva Ord.	7⅜—7$\frac{9}{16}$	..	5 4 11
796,980	5	Dec. 29	5	Do. 5 p.c. Pref.	5$\frac{1}{16}$—5$\frac{3}{16}$*	..	4 14 1
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
312,650	Stk.	Dec. 29	4	River Plate 4 p.c. Deb.	94—96*	..	4 3 4
250,000	5	Sept. 28	12	San Paulo, Ltd.	10½—11	..	5 9 1
115,000	10	,,	6	Do. 6 p.c. Pref.	11½—12	..	5 0 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Aug. 31	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	239—241	..	4 3 0
523,500	,,	,,	10	Do. C	239—241	..	4 3 0
90,000	10	Sept. 28	6	South African	8—9	..	6 13 4
6,429,895	Stk.	Aug. 16	5/9/4	South Met., 4 p.c. Ord.	116—118	..	4 12 8
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	79—81	..	3 14 1
209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	157—159	+2	5 6 11
605,000	Stk.	,,	5⅝	S'th Suburb'n Ord. 5 p.c.	121—123	.	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	117—120	..	4 3 4
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	121—123	..	4 1 4
502,310	Stk.	Nov. 10	5	Southampton Ord.	107—109	..	4 11 9
120,000	Stk.	Aug. 16	7½	Tottenham	145—148	..	4 16 3
483,940	,,	,,	5⅝	and	115—117	..	4 16 1
149,470	,,	Dec. 29	4	Edmonton	94—96*	..	4 3 4
182,380	10	,,	5	Tuscan, Ltd.	8½—9*	..	5 11 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	99—101	+3	4 19 0
236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	114—116	..	4 6 2
255,636	Stk.	Aug. 31	6⅞	Wands-	142—145	..	4 14 10
85,766	,,	Dec. 29	3	worth	71½—73½*	..	4 1 8

Prices marked * are "Ex. div."

With the present year, the firm of Messrs. John E. Williams and Co., of the Victoria Paint, Colour, and Varnish Works, Manchester, whose quarterly pocket diaries reach many of our readers, attain their jubilee; it having been as far back as the year 1862 that they commenced the manufacture of goods specially suitable for various gas-works' requirements.

Writing to the "Hull News," a correspondent says: "When an old gas-main was being taken out at Sunderland, a mouse was seen to run out at the end of the pipe. The pipe was then broken up, and in the interior was found a nest containing six young mice. How the animals could exist in a pipe which had gas passing through it, is regarded as remarkable; but the fact that there was a fracture in the pipe may in some degree explain the mystery."

We have received from the Harvey Electro-Chemical Company, Limited, of Norfolk House, Laurence Pountney Hill, E.C., a *résumé* of the several processes invented by Messrs. P. & Q. Marino for depositing metals and metallic alloys on other metals, ceramic ware, wood, &c. With regard particularly to the deposition of metals on to iron and steel, and also the deposition of metallic alloys, the latter gentleman has patented a process which, briefly described, consists in combining a reducing agent with the depositing solution, so that all traces of oxide films, &c., are removed concurrently with the deposition of the required metal or alloy. It is stated to give a solution which is not liable to decomposition by the depositing current, and yet has a low resistance and hence high efficiency. It further renders possible the use of solutions for various alloys in any required proportion. The process appears to be specially applicable to gas-fittings.

As usual, with the advent of a new year, we have to acknowledge the receipt of a number of diaries and calendars; and within the past few days they have reached us from the following: Messrs. Bale and Church, Limited; Messrs. Thomas Duxbury and Co.; The Gas-Meter Company, Limited; Simon-Carvès, Limited; Mr. Andrew Stephenson; and Messrs. F. C. Sugden and Co. The last-named firm are licensees for Hudson's patent producer, some particulars in regard to which are given in the introductory pages, which contain some useful remarks on regenerator and other settings.

In the "JOURNAL" for the 10th of October last, reference was made to the persistent refusal of the inhabitants of Ashford, Middlesex, to have the 16 miles of roads lighted by gas. Since then one public lamp has been erected; and this extraordinary position of affairs has prompted a resident to organize a burlesque in the form of a Court trial, "Hanbury *v.* the Mayor, Aldermen, and Burgesses of Darkford." The action is for damages suffered by a Mr. Hanbury in consequence of the alleged negligence of the "Darkford" Corporation in not illuminating the vicinity of a dangerous ditch—actually existing in the parish of Ashford. He claims £450 damages; and his statement includes an item of £1 9s. 6d. owing to Mr. Vintage for "medicated refreshment." A large sum is also claimed to compensate him for the shock given to his progressive ideas at discovering the absence of any lamps in a Twentieth Century parish. The defendants will endeavour to prove that artificial light is not altogether essential to mankind. Failing this, they have evidence that the accident to the imaginary plaintiff was not altogether unrelated to the influence of a hostelry lying between the railway station and the scene of the disaster.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Dec. 30. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.	
					Liverpool.	Manchester.
Tar, crude	per ton	—	21/9 26/6	23/- 27/-	—	23/6 27/-
Pitch	"	42/6	41/3	42/6	40/6	40/6
Benzol, 90%	per gallon	1/2½	1/-	1/-	1/-	-/11¾
Benzol, 50-90%	"	—	-/11½	-/11	-/11	-/10¾
Toluol, 90%	"	—	-/11	-/11	—	-/10¼
Crude naphtha, 30%	"	—	-/5	-/4½	-/5	-/4⅞
Light oil, 50%	"	—	-/4½	—	-/4¾	-/4¾
Solvent naphtha, 90-160	"	—	-/11	-/10½	—	-/10¾
Heavy naphtha, 90-190	"	—	-/11	-/11	—	-/11¼
Creosote in bulk	"	-/3⅛	-/2⅝	-/2 5/16	-/2⅝	-/2⅝
Heavy oils	"	—	-/2¾	-/2½	—	-/2⅞
Carbolic acid, 60's	"	—	3/1	3/-	—	—
Naphthalene, crude drained salts	per ton	—	44/6	42/6	47/6	47/6 50/-
" pressed	"	—	61/-	63/-	60/-	60/- 75/-
" whizzed	"	—	—	—	70/- 72/6	65/- 75/-
Anthracene	per unit	-/1⅞ -/2	-/1½	-/1½	-/1¼	-/1¼

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

MANAGER (Argentine Republic). No. 5502.

WORKS MANAGER. Annfield Plain Gas Company.

ASSISTANT-MANAGER (Tar Distillation, &c.). No. 5500.

JUNIOR ASSISTANT-ENGINEER. No. 5499.

DRAUGHTSMAN. Drakes, Limited, Halifax.

INSPECTOR (Rural Water Company). No. 5504.

CARBONIZING FOREMAN. No. 5501.

Appointments Wanted.

CHEMICAL PLUMBER, &c. No. 5492.

CHEMIST (Analytical Tests, &c.). R. Walker, Farnley.

COMMERCIAL MAN (with Investment if desired). No. 5503.

Meeting.

MITCHAM AND WIMBLEDON GASLIGHT COMPANY. Caxton Hall, Westminster. Jan. 16. Three o'clock.

Stocks and Shares.

SOUTHEND WATER COMPANY. By Auction. Jan. 23.

GREAT YARMOUTH WATER-WORKS COMPANY. By Auction. Jan. 23.

TENDERS FOR

Coal.

COPENHAGEN LIGHTING DEPARTMENT. Tenders by Jan. 10.

Fire Clay Goods.

LEEDS GAS DEPARTMENT. Tenders by Jan. 13.

BURY CORPORATION. Tenders by Jan. 11.

Tar and Liquor.

BELFAST GAS DEPARTMENT. Tenders by Jan. 11.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1912, are reminded that this can only be done during January.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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D. ANDERSON AND COMPANY,
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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

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